INTERIM RESPONSE ACTION (IRA)
ADMINISTRATIVE RECORD FILE IR-0100

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The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-100-101

DOE/OR/21548-154
CONTRACT NO. DE-AC05-86OR21548

SCREENING LEVEL CHARACTERIZATION OF ELECTRICAL SUBSTATION 411

For the
Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

Prepared by MK-Ferguson Company and Jacobs Engineering Group

NOVEMBER 1990 REV. 0

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

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DOE/OR/21548-154

Weldon Spring Site Remedial Action Project

Screening Level Characterization of Electrical Substation 411

November 1990

Revision 0

Prepared by

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Prepared for

U.S. DEPARTMENT OF ENERGY
Oak Ridge Operations Office
Under Contract DE-AC05-86OR21548

substat.411/tms/jcf

ABSTRACT

Substation 411 transformer dielectric fluids were sampled for uranium and PCBs. The exterior surfaces of the metal transformers were measured for radioactivity. Results of the sampling revealed that some transformer fluid contained PCBs, but no uranium in excess of naturally occurring amounts was detected. In addition, the exterior surface of the transformers were uncontaminated. Subject to measurement of the base of the transformers (which were inaccessible during the surface scans for radioactivity), the transformers and dielectric fluids may be removed from the site for disposal.

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1 INTRODUCTION

This report presents characterization data for the Number 411 Electrical Substation located on Department of Conservation properties south of the Weldon Spring Chemical Plant (WSCP). Sample collection methods, sampling equipment and analytical results are also presented in this report. The objective of this characterization was to supply data needed to prepare a subcontract package for the removal of all transformers and dielectric fluids contained in Substation 411.

2 SAMPLING

Actual sampling of Substation 411 was undertaken April 23 and 24, 1990. This included soil sampling throughout the area and retrieving dielectric fluids (oil) samples from each transformer. A sampling plan was developed previous to sampling. This plan contains detailed information on sampling locations, sampling equipment, sampling techniques and personal protective equipment used during the sampling of Substation 411. This sampling plan is provided in Appendix A.

As mentioned in the sampling plan, two pole mounted transformers located within Substation 411 could not be sampled due to safety concerns. On June 14, 1990, a subcontractor was employed to disconnect and remove the transformers from their respective poles and place them on the substation concrete pad. The transformers were sampled on June 20, 1990 using sampling techniques and equipment contained in the sampling plan.

3 RESULTS

Each group of analytical parameters for oil and soil samples is discussed in detail in the following sections. All interpretations made in this report are based on analytical results, field observations and historical data.

3.1 Substation 411 Transformer Dielectric Fluids

The summary of oil analysis for PCB's and uranium may be found in Table 3-1. Also contained in the table is physical information regarding the transformers.

3.1.1 Radiological

Oil from each transformer was sampled either individually or through composites for natural uranium. The highest level detected was 62 pCi/l. Because there is no regulatory limit for uranium in transformer fluids, and also no background level information available for uranium in transformer fluids, a second round of sampling took place on August 20 and 21, 1990 to evaluate sampling and/or analysis variability. A blank containing motor oil was sent to the lab to establish a sample analysis background concentration. Triplicate samples were obtained for each transformer and the motor oil. Results of the lab analysis for this event are presented in Table 3-2. On September 6, 1990 a transmittal was received by the lab stating that 62 pCi/l had been detected, but that the value should be questioned because of contamination of the lab equipment. After decontamination of the lab equipment the sample was rerun, obtaining a value of <0.68 pCi/l, which is below the detection limit. With this result noted, the next highest level detected for the first sampling event was 2 pCi/l. Concentrations of

TABLE 3-1 Electrical Substration 411 Information

Unit	Serial Number	Oil Volume	PCB Level of Fluid	Uranium Level of Fluid
Transformer	2715-1	1,285 gallons	<10 PPM	2 pCi/l
Transformer	2715-2	1,285 gallons	<10 PPM	2 pCi/l
Transformer	C-500897	362 gallons	157 PPM Arochlor 1260	2 pCi/l
3 Phase Oil Circuit Breaker	12696	270 gallons 90 gal/unit	<10 PPM	0.68 pCi/l
Pole Transformer	Unknown	Apprx. 40 gallons	<10 PPM	0.68 pCi/l
Single Phase Pole Transformer	2814-16	12 gallons	1100 PPM Arochlor 1260	*<0.68 pCi/l
Three Phase Metering Outfit	58E6844	24 gallons	6.1 PPM Arochlor 1260	*<0.68 pCi/l

* - Uranium sample composited from single phase transformer and metering outfit. The sample was originally reported as 62 pCi/l. Information received from the lab stated this level was due to equipment contamination. After decontamination, the sample was rerun, obtaining this result.

TABLE 3-2 Electrical Substation 411 Information for Uranium Samples - Collected August 20 & 21, 1990

Unit	Serial Number	Uranium Levels of 3 Confirmation Triplicate Samples (pCi/l)
Transformer	2715-1	1.1 - 1.5 - 1.3
Transformer	2715-2	12.1 - 0.72 - 1.1
Transformer	C-500897	0.7 - 2.0 - 0.65
3 Phase Oil Circuit Breaker	12696	0.7 - 1.1 - 5.0
Pole Transformer	Unknown	0.5 - 9.5 - 0.5
Single Phase Pole Transformer	2814-16	0.5 - 0.5 - 0.8
Three Phase Metering Outfit	58E6844	4.1 - 2.4 - 3.4
Motor Oil	EXXON	<0.4 - 1.8 - 10.0

2 pCi/l or less are within expected limits considering the natural distribution of uranium typically found in the environment. The results of the second round of sampling at locations identified in Table 3-2 indicate that the distribution of detected levels of transformer oils is not above the upper limits of the distribution of values for the background sample of motor oil.

3.1.2 PCB's

Oil from each transformer was sampled for PCBs. Lab analysis indicates that the General Electric transformer containing 362 gallons of oil has a level of 157 ppm of the PCB Arochlor 1260. The three-phase metering outfit containing 24 gallons of oil has a level of 6.1 ppm of the PCB Arochlor 1260. The single phase transformer containing 12 gallons of oil has a level of 1,100 ppm of the PCB Arochlor 1260.

Due to the concerns associated with a possible PCB spill, transformers containing detectable levels of PCBs were drained of oil on August 24, 1990. The oil was stored in Building 434. The transformer containing 1100 ppm PCB oil was also flushed with diesel fuel as specified for transformers containing greater than 500 ppm PCB's in 40 CFR 761.60(b)(1)(i)B.

3.2 SUBSTATION 411 SOILS

This section presents analytical lab results for Hazardous Substance List (HSL) metals, lithium, molybdenum, nitroaromatics and PCB's from soil samples taken in the area immediately surrounding Substation 411. These results are presented in Appendix B of this report.

3.2.1 Metals

Two composite soil samples were collected in the area immediately surrounding Substation 411 and analyzed for HSL metals, lithium and molybdenum. As the lab results in Appendix B indicate, these soil samples appear to be at levels considered background for this area. Documentation of background results can be found in Chemical Soil Investigation Report for the WSCP/RPs, Phase II (DOE/OR/21548-061, August 1989).

3.2.2 Nitroaromatics

Two composite soil samples were also collected in the substation area and analyzed for nitroaromatics. This was deemed important because the electrical Substation 411 was constructed directly over an Ordnance Works TNT line which had been abandoned. The composite samples taken for nitroaromatics were chosen to represent the entire area around Substation 411. Additional samples were taken near the abandoned TNT line. As the lab results in Appendix B demonstrate, the two samples had nitrobenzene concentrations of 1.3 and 3.7 ppm. Such low levels do not warrant any special precautions during removal of the transformer oils and carcasses contained in Substation 411.

3.2.3 PCB's

Individual and composite soil samples for PCB analysis were collected at eleven locations in the area surrounding and within Substation 411. One composite sample for PCB's was also taken near a pole transformer lying on the ground 100 yards due south of Substation 411. As the lab results in Appendix B indicate, only two samples had PCB concentrations above the detection limit. These levels correspond to individual samples taken down gradient from the transformer containing 157 ppm PCB oil. Although these levels of 2.2 and 3.6 ppm are above detection limits, they are well below the 10 ppm clean up criteria for an uncontrolled access area (40 CFR 761.125(c)(4)).

3.3 EXTERIOR RADIOLOGICAL CONTAMINATION

The tops and sides of the transformer carcasses were scanned with a gamma-beta detector and swiped for radiological contamination. The units were determined to be slightly above background levels, but within the uranium surface contamination guidelines for unrestricted release. However, the bottoms of all electrical units will require survey prior to release. This will be performed during removal of the units, which will require heavy equipment. The on-site analysis of paint scrapings removed from the surfaces of the No. 411 Electrical Substation units indicates uranium to be the primary contaminant, thus uranium will be the focal point of our sampling of the transformer bases.

4 CONCLUSIONS/RECOMMENDATION

There is no data to suggest that the transformer oils from substation 411 contain uranium above naturally occurring levels and, therefore, should not be considered a mixed waste. This is supported by lab analysis presented in Section 3.1.1. Also with the bottoms of the electrical units withstanding, the units are within the uranium surface contamination guidelines for unrestricted release as mentioned in Section 3.3.

It is recommended that the oils and transformer carcasses be disposed of as non-radiological contaminated material.

APPENDIX A
SUBSTATION 411 SAMPLING PLAN

substat.411/tma/jof

112190

Weldon Spring Site Remedial Action Project

No. 411 Electrical Substation Sampling Plan

April 1990

Prepared by

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7295 Highway 94 South
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Prepared for

U.S. DEPARTMENT OF ENERGY
Oak Ridge Operations Office
Under Contract DE-AC05-86OR21548

substat.411/tna/jof

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1 INTRODUCTION

This plan describes the sampling effort to be conducted in April 1990 to determine PCB and radiological content of individual transformers and area soil at the No. 411 Electrical Substation. Soil samples for nitroaromatics and HSL metals plus lithium and molybdium will also be retrieved for this exercise.

2 OBJECTIVES

This sampling effort will be performed to determine whether dielectric fluids in the No. 411 transformers are PCB and/or radiologically contaminated. The effort will also determine if the soil in and immediately surrounding No. 411 is contaminated by PCB's, nitroaromatics, HSL metals plus lithium and molybdeium. The data collected will then be used by the PMC prepare a subcontract package for transformer removal.

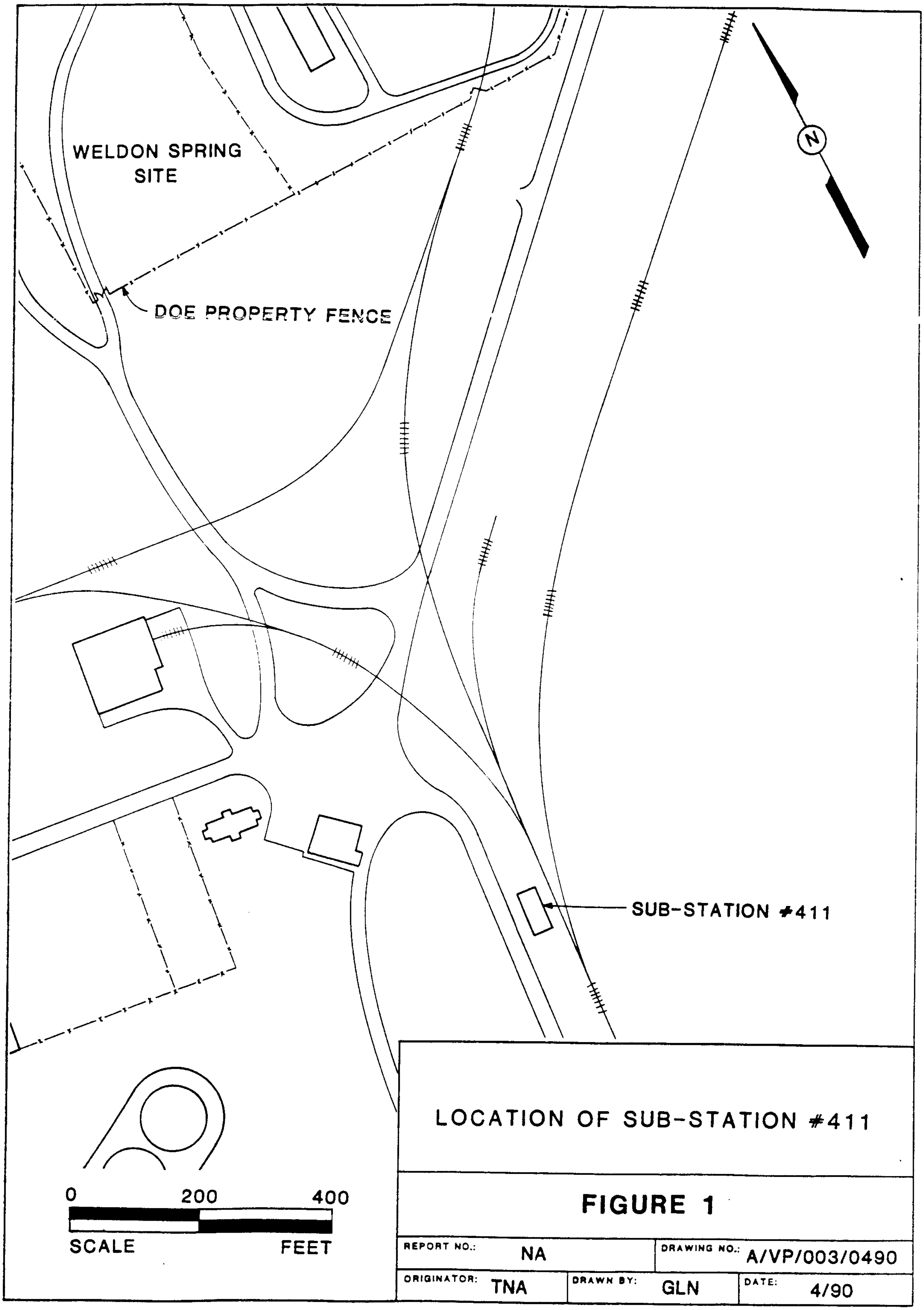
3 SAMPLING SCHEDULE

Samples will be collected during April 1990. The samples will be collected by Environmental Safety and Health (ES&H) personnel. Prior to the actual sampling, the following requirements will be fulfilled:

- The required sampling and safety equipment will be available.
- The respiratory protection program will be in operation.
- The Spill Prevention, Control and Containment Plan (SPCC Plan) will be in effect.
- Laboratories will have been selected to perform sample analysis.
- The Weldon Spring Site Remedial Action Project (WSSRAP) Operations Department will have certified that all transformers are electrically discharged and grounded.
- Access to all of the transformers will have been established.

3.1 SAMPLING LOCATIONS

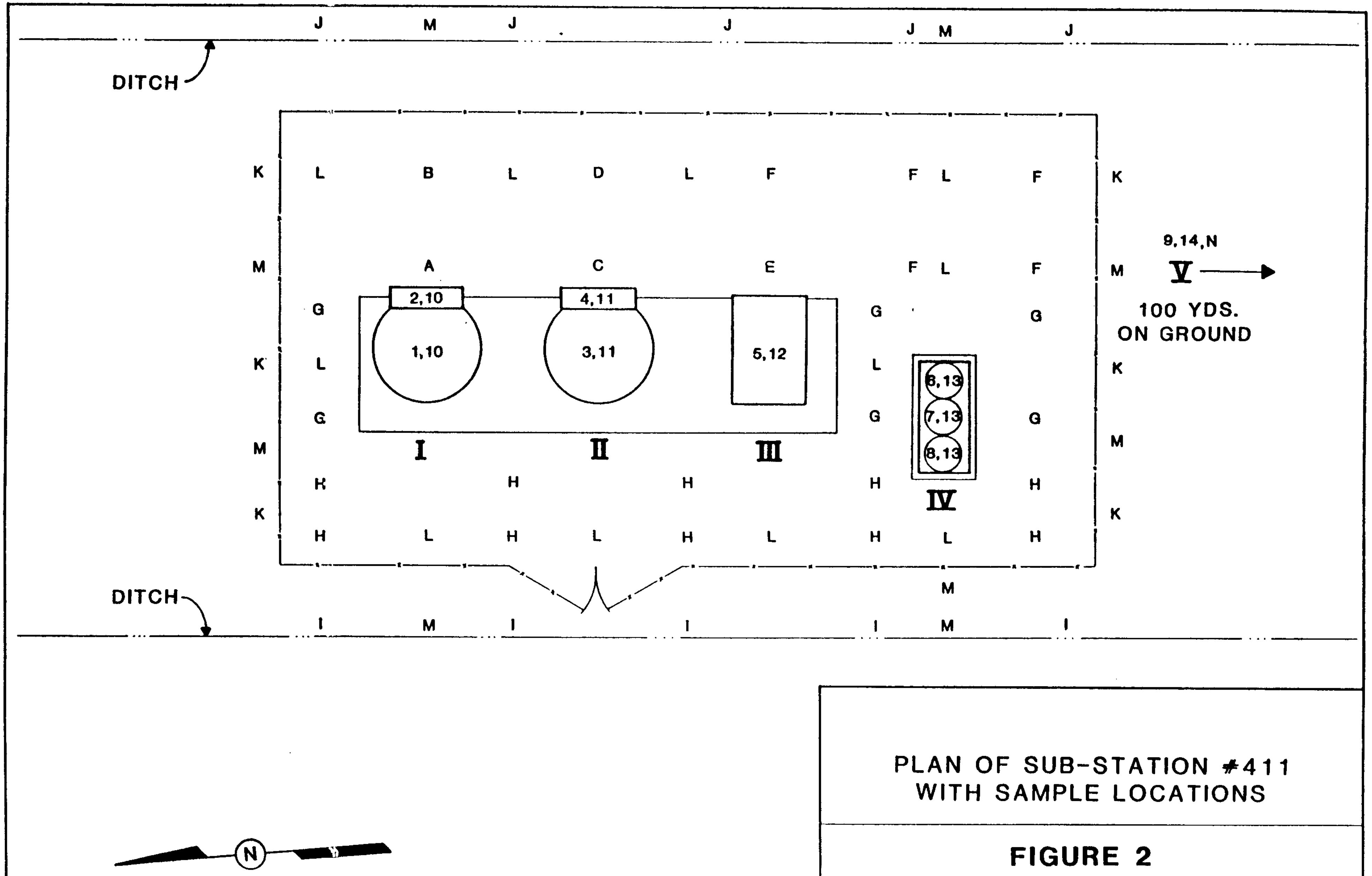
The location of the No. 411 Electrical Substation is shown in Figure 1. Locations for proposed oil and soil sampling are presented in Figure 2. Tables 1 and 2 detail information for each sampling location and Table 3 lists physical information for each transformer. Individual oil samples for PCB's will be



LOCATION OF SUB-STATION #411

FIGURE 1

REPORT NO.: NA		DRAWING NO.: A/VP/003/0490
ORIGINATOR: TNA	DRAWN BY: GLN	DATE: 4/90



PLAN OF SUB-STATION #411
WITH SAMPLE LOCATIONS

FIGURE 2

REPORT NO.:	NA			DRAWING NO.:	A/VP/004/0490
ORIGINATOR:	TNA	DRAWN BY:	GLN	DATE:	4/90

TABLE 1 Oil Sampling Locations

Number From Figure 2	Sample Type	Parameter	Sample Number	Description
1	Individual	PCB's	TO-0001-Date	Transformer I
2	Individual	PCB's	TO-0002-Date	Reservoir Tank on Transformer I
3	Individual	PCB's	TO-0003-Date	Transformer II
4	Individual	PCB's	TO-0004-Date	Reservoir Tank on Transformer II
5	Individual	PCB's	TO-0005-Date	Transformer III
6	Individual	PCB's	TO-0006-Date	Eastside vessel of 3-phase circuit breaker
7	Individual	PCB's	TO-0007-Date	Middle vessel of 3-phase circuit breaker
8	Individual	PCB's	TO-0008-Date	Westside vessel of 3-phase circuit breaker
9	Individual	PCB's	TO-0009-Date	Pole transformer lying 100 yards south of No. 411 on ground
10	Composite	Nat. Uranium, Total	TO-0010-Date	Transformer I and Reservoir Tank
11	Composite	Nat. Uranium, Total	TO-0011-Date	Transformer II and Reservoir Tank
12	Individual	Nat. Uranium, Total	TO-0012-Date	Transformer III
13	Composite	Nat. Uranium, Total	TO-0013-Date	All 3 vessels from 3-phase circuit breaker
14	Individual	Nat. Uranium, Total	TO-0014-Date	Pole transformer lying 100 yards south of No. 411 on ground

TABLE 2 Soil Sampling Locations

Letter From Figure 2	Sample Type	Parameter	Sample Number
A	Individual	PCB's	TS-000A-Date
B	Individual	PCB's	TS-000B-Date
C	Individual	PCB's	TS-000C-Date
D	Individual	PCB's	TS-000D-Date
E	Individual	PCB's	TS-000E-Date
F	Composite	PCB's	TS-000F-Date
G	Composite	PCB's	TS-000G-Date
H	Composite	PCB's	TS-000H-Date
I	Composite	PCB's	TS-000I-Date
J	Composite	PCB's	TS-000J-Date
K	Composite	PCB's	TS-000K-Date
L	Composite	Nitroaromatics HSL Metals and Li, Mo	TS-000L-Date
M	Composite	Nitroaromatics HSL Metals and Li, Mo	TS-000M-Date
N	Composite	PCB's	TS-000N-Date

TABLE 3 Physical Information on Transformers

Number From Figure 2	Serial Number	Manufacturer	Oil Capacity	Description
I	2715-1	Pennsylvania	1,285 gallons	Transformer
II	2715-2	Pennsylvania	1,285 gallons	Transformer
III	C-500897	General Electric	362 gallons	Transformer
IV	12696	Pacific Electric	270 gallons 90 gal/unit	3 phase oil circuit breaker
V	Unknown	Unknown	approx. 40 gal	Pole transformer lying on ground

taken, however most radiological oil samples will be composited. Two composite soil samples will be retrieved to determine the presence or absence of nitroaromatics and HSL metals plus lithium and molybdeum.Individual PCB soil samples will be retrieved where visible oil leakage has occurred. PCB composite samples will be taken to screen the majority of the area. Two small pole transformers are contained above No. 411 but will not be sampled in this effort due to safety concerns. These units are to be treated as PCB-contaminated for purposes of subcontract development.

3.2 Sample Collection

Sampling personnel will use the personal protective equipment listed in Table 4 during the actual sampling operations. In addition the equipment listed in Table 4 will be available for use during sample collection. Spill response equipment will also be on hand.

Personal chemical contamination control must be practiced during and following the collection and shipment of these samples. Samples will be collected by a team of at least two persons as follows:

- Prepare a field data sheet for the sample to be collected. An example field data sheet is presented in Figure 3.

- Select the corresponding pre-labeled sample bottles for the sample to be collected at that location.

- Place plastic sheeting and containers under sample ports where applicable for spill control.

TABLE 4 Equipment Needed For Transformer Sampling

Item	Usage
Tool set	Transformer opening
Buckets	Spill control
Plastic sheeting	Spill control
Oil absorbent pillows and booms	Spill control
Peristaltic pump	Sample drawing
Peristaltic pump	Sample drawing
Generator	Sample drawing
Funnels	Sample drawing
Spoons	Sampling
Sample bottles	Sample shipping
Ziploc bags	Sample shipping
D.I. Water	Decontamination
Hexane	Decontamination
Camera	Documentation
Sample labels	Documentation
Field data sheets	Documentation
Log book	Documentation
Half-face respirator with organic vapor cartridges	Personal protection
Disposable boot covers	Personal protection
Hard hats	Personal protection
Saranex or polycoated tyvek	Personal protection
Face shields	Personal protection
Nitrile gloves/surgical gloves	Personal protection
Radiation monitoring equipment	Personal protection
Two-way radio	Personal protection
Flags	Marking Soil Sample Locations
PCB Field Test Kits	Sampling

FIGURE 3 Transformer Fluid and Soil Sampling - Field Data Sheet

Sample Number: ______________________ Date: ____________

Sample Time: __________________

Sampling Location Description: ____________________________________

____

____

____

Sample Description: ____

____

____

____

Radiation Level:

______ Background

______ Elevated Amount: __________ cpm

Instrument: ____

____

____

____

Samplers Signature ____

Comments: ____

____

____

____

____

- Slowly open the valve with a sample bottle under the spigot where applicable. Fill the bottle only 3/4 full.
- If sample valves and spigots are inaccessible, entry will be gained at the top of each transformer. A peristaltic pump will then be used to collect samples.
- Seal the caps on the sample bottles with tape.
- Place the oil sample bottles in separate Ziploc bags.
- Clean up the surrounding area.
- Decontaminate equipment following the procedures in WSSRAP ES&H SOP 4.1.3.
- Containerize and store any contaminated articles which cannot be decontaminated.

RADIATION MONITORING

A member of the Health Physics Group will measure the radiation levels of the individual samples prior to shipment of the samples off site. Surface radiation levels for each transformer will be measured by Health Physics technicians.

QUALITY CONTROL

One duplicate sample will be taken for oil and soil for PCB's.

REPORTING OF ANALYTICAL RESULTS

The lab data, field data, and drawings showing the sampling locations will be incorporated in a final report by ES&H for submittal to the Engineering Department. This report will be completed approximately June 1990.

APPENDIX B
SUBSTATION 411 SOILS LAB REPORTS

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 2

DATA SUMMARY

Client ID: TS-000A-042490

JTC ID: 90-04-062-01A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	1900	5/24/90
Arochlor-1221	BQL	μg/Kg	1900	5/24/90
Arochlor-1232	BQL	μg/Kg	1900	5/24/90
Arochlor-1242	BQL	μg/Kg	1900	5/24/90
Arochlor-1248	BQL	μg/Kg	1900	5/24/90
Arochlor-1254	BQL	μg/Kg	1900	5/24/90
Arochlor-1260	BQL	μg/Kg	3800	5/24/90

BQL = Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 3

DATE SUMMARY

Client ID: TS-000B-042490 JTC ID: 90-04-062-02A

Location ID: WSSRAP Matrix: Soil Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	95	5/24/90
Arochlor-1221	BQL	μg/Kg	95	5/24/90
Arochlor-1232	BQL	μg/Kg	95	5/24/90
Arochlor-1242	BQL	μg/Kg	95	5/24/90
Arochlor-1248	BQL	μg/Kg	95	5/24/90
Arochlor-1254	BQL	μg/Kg	190	5/24/90
Arochlor-1260	BQL	μg/Kg	190	5/24/90

BQL = Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 4

DATA SUMMARY

Client ID: TS-000C-042490 | JTC ID: 90-04-062-03A

Location ID: WSSRAP | Matrix: Soil | Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	µg/Kg	10,000	5/24/90
Arochlor-1221	BQL	µg/Kg	10,000	5/24/90
Arochlor-1232	BQL	µg/Kg	10,000	5/24/90
Arochlor-1242	BQL	µg/Kg	10,000	5/24/90
Arochlor-1248	BQL	µg/Kg	10,000	5/24/90
Arochlor-1254	BQL	µg/Kg	20,000	5/24/90
Arochlor-1260	BQL	µg/Kg	20,000	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 5

DATA SUMMARY

Client ID: TS-000D-042490

JTC ID: 90-04-062-04A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	980	5/24/90
Arochlor-1221	BQL	μg/Kg	980	5/24/90
Arochlor-1232	BQL	μg/Kg	980	5/24/90
Arochlor-1242	BQL	μg/Kg	980	5/24/90
Arochlor-1248	BQL	μg/Kg	980	5/24/90
Arochlor-1254	BQL	μg/Kg	2000	5/24/90
Arochlor-1260	2200	μg/Kg	2000	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 6

DATA SUMMARY

Client ID: TS-000E-042490

JTC ID: 90-04-062-05A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	1500	5/24/90
Arochlor-1221	BQL	μg/Kg	1500	5/24/90
Arochlor-1232	BQL	μg/Kg	1500	5/24/90
Arochlor-1242	BQL	μg/Kg	1500	5/24/90
Arochlor-1248	BQL	μg/Kg	1500	5/24/90
Arochlor-1254	BQL	μg/Kg	3000	5/24/90
Arochlor-1260	3600	μg/Kg	3600	5/24/90

BQL = Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 7

DATA SUMMARY

Client ID: TS-000F-042490

JTC ID: 90-04-062-06A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	120	5/24/90
Arochlor-1221	BQL	μg/Kg	120	5/24/90
Arochlor-1232	BQL	μg/Kg	120	5/24/90
Arochlor-1242	BQL	μg/Kg	120	5/24/90
Arochlor-1248	BQL	μg/Kg	120	5/24/90
Arochlor-1254	BQL	μg/Kg	230	5/24/90
Arochlor-1260	BQL	μg/Kg	230	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 8

DATA SUMMARY

Client ID: TS-000G-042490

JTC ID: 90-04-062-07A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	1200	5/24/90
Arochlor-1221	BQL	μg/Kg	1200	5/24/90
Arochlor-1232	BQL	μg/Kg	1200	5/24/90
Arochlor-1242	BQL	μg/Kg	1200	5/24/90
Arochlor-1248	BQL	μg/Kg	1200	5/24/90
Arochlor-1254	BQL	μg/Kg	2400	5/24/90
Arochlor-1260	BQL	μg/Kg	2400	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 9

DATA SUMMARY

Client ID: TS-000H-042490

JTC ID: 90-04-062-08A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	$\mu g/g$	1000	5/24/90
Arochlor-1221	BQL	$\mu g/g$	1000	5/24/90
Arochlor-1232	BQL	$\mu g/g$	1000	5/24/90
Arochlor-1242	BQL	$\mu g/g$	1000	5/24/90
Arochlor-1248	BQL	$\mu g/g$	1000	5/24/90
Arochlor-1254	BQL	$\mu g/g$	2100	5/24/90
Arochlor-1260	BQL	$\mu g/g$	2100	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 10

DATA SUMMARY

Client ID: TS-000I-042490

JTC ID: 90-04-062-09A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	µg/Kg	1200	5/24/90
Arochlor-1221	BQL	µg/Kg	1200	5/24/90
Arochlor-1232	BQL	µg/Kg	1200	5/24/90
Arochlor-1242	BQL	µg/Kg	1200	5/24/90
Arochlor-1248	BQL	µg/Kg	1200	5/24/90
Arochlor-1254	BQL	µg/Kg	2500	5/24/90
Arochlor-1260	BQL	µg/Kg	2500	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 11

DATA SUMMARY

Client ID: TS-000J-042490

JTC ID: 90-04-062-10A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	1200	5/24/90
Arochlor-1221	BQL	μg/Kg	1200	5/24/90
Arochlor-1232	BQL	μg/Kg	1200	5/24/90
Arochlor-1242	BQL	μg/Kg	1200	5/24/90
Arochlor-1248	BQL	μg/Kg	1200	5/24/90
Arochlor-1254	BQL	μg/Kg	2500	5/24/90
Arochlor-1260	BQL	μg/Kg	2500	5/24/90

BQL = Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 12

DATA SUMMARY

Client ID: TS-000K-042490

JTC ID: 90-04-062-11A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	µg/Kg	1000	5/24/90
Arochlor-1221	BQL	µg/Kg	1000	5/24/90
Arochlor-1232	BQL	µg/Kg	1000	5/24/90
Arochlor-1242	BQL	µg/Kg	1000	5/24/90
Arochlor-1248	BQL	µg/Kg	1000	5/24/90
Arochlor-1254	BQL	µg/Kg	2100	5/24/90
Arochlor-1260	BQL	µg/Kg	2100	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 13

DATA SUMMARY

Client ID: TS-000N-042490

JTC ID: 90-04-062-12A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	µg/Kg	1400	5/24/90
Arochlor-1221	BQL	µg/Kg	1400	5/24/90
Arochlor-1232	BQL	µg/Kg	1400	5/24/90
Arochlor-1242	BQL	µg/Kg	1400	5/24/90
Arochlor-1248	BQL	µg/Kg	1400	5/24/90
Arochlor-1254	BQL	µg/Kg	2700	5/24/90
Arochlor-1260	BQL	µg/Kg	2700	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 14

DATA SUMMARY

Client ID: TS-000B-042490-DU

JTC ID: 90-04-062-13A

Location ID: WSSRAP

Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/04/90

PCB	Concentration	Units of Measure	Quantitation Limit	Date Analyzed
Arochlor-1016	BQL	μg/Kg	1000	5/24/90
Arochlor-1221	BQL	μg/Kg	1000	5/24/90
Arochlor-1232	BQL	μg/Kg	1000	5/24/90
Arochlor-1242	BQL	μg/Kg	1000	5/24/90
Arochlor-1248	BQL	μg/Kg	1000	5/24/90
Arochlor-1254	BQL	μg/Kg	2000	5/24/90
Arochlor-1260	BQL	μg/Kg	2000	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 15

RESULTS OF NITROAROMATIC ANALYSES

Client ID: TS-000L-042490 JTC ID: 90-04-062-14A

Location ID: WSSRAP Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/11/90
Date Analyzed: 5/30/90

Nitroaromatic Compound	Concentration	Units of Measure	Quantitation Limit
2,4-DNT	BQL	µg/g	0.344
2,6-DNT	BQL	µg/g	0.424
1,3-DNB	BQL	µg/g	0.401
1,3,5-TNB	BQL	µg/g	0.395
2,4,6-TNT	BQL	µg/g	0.369
Nitrobenzene	3.734	µg/g	0.443

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 16

RESULTS OF NITROAROMATIC ANALYSES

Client ID: TS-000M-042490 JTC ID: 90-04-062-15A

Location ID: WSSRAP Matrix: Soil

Date Sampled: 4/24/90
Date Extracted: 5/11/90
Date Analyzed: 5/30/90

Nitroaromatic Compound	Concentration	Units of Measure	Quantitation Limit
2,4-DNT	BQL	μg/g	0.353
2,6-DNT	BQL	μg/g	0.436
1,3-DNB	BQL	μg/g	0.412
1,3,5-TNB	BQL	μg/g	0.406
2,4,6-TNT	BQL	μg/g	0.380
Nitrobenzene	1.32	μg/g	0.456

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84

TABLE 17 (REVISED)

RESULTS OF METALS ANALYSES

Client ID: TS-000L-042490 JTC ID: 90-04-062-14A

Location ID: WSSRAP Matrix: Soil

Date Sampled: 4/24/90
Date Digested: 5/08/90
Hg Digested: 5/01/90

Parameter	Concentration	Units of Measure	Detection Limit	Methods Followed	Date Analyzed
Aluminum	3210	mg/Kg	39.2	200.7	5/23/90
Antimony	BQL	mg/Kg	15.2	200.7	5/23/90
Arsenic	BQL	mg/Kg	2.0	206.2	5/18/90
Barium	34.7	mg/Kg	3.0	200.7	5/23/90
Beryllium	BQL	mg/Kg	0.2	200.7	5/23/90
Cadmium	1.86	mg/Kg	0.8	200.7	5/23/90
Calcium	102426	mg/Kg	106	200.7	5/23/90
Chromium	8.02	mg/Kg	1.6	200.7	5/23/90
Cobalt	2.44	mg/Kg	1.8	200.7	5/23/90
Copper	110.2	mg/Kg	3.4	200.7	5/23/90
Iron	5302	mg/Kg	16.8	200.7	5/23/90
Lead	36.8	mg/Kg	0.6	239.2	5/10/90
Magnesium	24500	mg/Kg	87	200.7	5/23/90
Manganese	202	mg/Kg	0.8	200.7	5/23/90
Mercury	BQL	mg/Kg	0.1	245.5	5/02/90
Nickel	6.14	mg/Kg	4.6	200.7	5/23/90
Potassium	690	mg/Kg	158	258.1	5/20/90
Selenium	BQL	mg/Kg	1.0	270.2	5/11/90
Silver	BQL	mg/Kg	3.8	200.7	5/23/90
Sodium	326	mg/Kg	110	273.1	5/20/90
Thallium	BQL	mg/Kg	2.0	279.2	5/17/90
Vanadium	8.32	mg/Kg	2.2	200.7	5/23/90
Zinc	996	mg/Kg	2.8	200.7	5/23/90
Lithium	5.28	mg/Kg	4.0	200.7	5/24/90
Molybdenum	BQL	mg/Kg	4.0	200.7	5/24/90

BQL - Below Quantitation Limit

JTC DATA REPORT 90-174

Contract No. 3589/15-1000-1-11000
P.O. No. 3589-1002-1979
Request No. 84 (REVISED)

TABLE 18

RESULTS OF METALS ANALYSES

Client ID: TS-000M-042490 JTC ID: 90-04-062-15A

Location ID: WSSRAP Matrix: Soil Date Sampled: 4/24/90
Date Digested: 5/21/90

Parameter	Concentration	Units of Measure	Detection Limit	Methods Followed	Date Analyzed
Aluminum	7372	mg/Kg	39.2	200.7	5/23/90
Antimony	BQL	mg/Kg	15.2	200.7	5/23/90
Arsenic	2.88	mg/Kg	2.0	206.2	5/18/90
Barium	58.2	mg/Kg	3.0	200.7	5/23/90
Beryllium	0.4	mg/Kg	0.2	200.7	5/23/90
Cadmium	BQL	mg/Kg	0.8	200.7	5/23/90
Calcium	62782	mg/Kg	106	200.7	5/23/90
Chromium	11.4	mg/Kg	1.6	200.7	5/23/90
Cobalt	3.86	mg/Kg	1.8	200.7	5/23/90
Copper	18.7	mg/Kg	3.4	200.7	5/23/90
Iron	8432	mg/Kg	16.8	200.7	5/23/90
Lead	95	mg/Kg	0.6	239.2	5/10/90
Magnesium	2098	mg/Kg	87	200.7	5/23/90
Manganese	321	mg/Kg	0.8	200.7	5/23/90
Mercury	0.1	mg/Kg	0.1	245.5	5/02/90
Nickel	8.6	mg/Kg	4.6	200.7	5/23/90
Potassium	864	mg/Kg	158	258.1	5/20/90
Selenium	BQL	mg/Kg	1.0	270.2	5/11/90
Silver	BQL	mg/Kg	3.8	200.7	5/23/90
Sodium	214	mg/Kg	110	273.1	5/20/90
Thallium	BQL	mg/Kg	2.0	279.2	5/17/90
Vanadium	17.2	mg/Kg	2.2	200.7	5/23/90
Zinc	381	mg/Kg	2.8	200.7	5/23/90
Lithium	BQL	mg/Kg	4.0	200.7	5/23/90
Molybdenum	BQL	mg/Kg	4.0	200.7	5/23/90

BQL = Below Quantitation Limit

200 0 200 400
SCALE FEET

MKE DOCUMENT NO. 5121-C : DW-D-01-0180-00

U. S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

CHEMICAL PLANT
CONSTRUCTION DRAWINGS

TRANSFORMER LOCATION PLAN

DESIGNED	DRAWN WSO/JMM
CHECKED	
INSPECTED	
RECOMMENDED	

APPROVED	DATE	CHIEF ENG./QA MGR	DATE	PMC ENG'G MGR	DATE	DOE PROJ. ENG.
			5-1-87			

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY
WSSRA PROJECT
180 HOWARD ST. SAN FRANCISCO CA 94105

PROJECT NO: DE-AC05-86OR21548
DRAWING NO: 5121E-CP-583

QA MKE	ENG'G MGR	QA MK-F	DOE APP.

CP - PCB REMOVAL

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303
December 11, 1990

Addressees:

SCREENING LEVEL CHARACTERIZATION OF ELECTRICAL SUBSTATION 411 REPORT

Enclosed for your information is the subject document. This report contains data necessary to prepare a subcontract package for the removal of all transformers and dielectric fluids contained in substation 411.

If you have any questions please call Ken Lawver at (314)441-8978.

Sincerely,

for [signature] Acting
Stephen H. McCracken
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

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3583·87·I·EPA·ad

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

M-K FERGUSON CO.
RECEIVED
NOV 10 1987
WSSRAP CONTRACT 3589

NOV 9 1987

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. ~~Nelson~~ Rod:

We have reviewed the material you provided on the following interim response actions proposed for the Weldon Spring site:

1. Dismantling of Building 401
2. Dismantling of Building 409
3. Removal of PCB Transformers
4. Debris Consolidation

These actions, as with the four other interim response actions we have reviewed, should be useful in preparing for long-term remedial actions and have positive effects on health and safety and the environment. The documents developed in support of these proposals represent a significant improvement over those developed for the previous actions. Generally, we believe that a more thorough analysis and screening of response alternatives would be appropriate. Also, the documents do not contain sufficient detail of the work to be done to stand alone without the support of the technical specifications and drawings. Other comments and recommendations regarding these interim response actions are discussed below.

Building Demolition

- More specifics regarding the handling, storage and ultimate disposal of radioactively contaminated waste should be presented.

- The specifications state that "..., if chemically hazardous or toxic material is suspected or encountered, the Contractor shall be immediately notified...". What guidelines will be used by the demolition subcontractor to determine the hazard potential of unknown materials?

- The responsibility for determining whether a pollution condition has or will be created should be clearly specified.

- The specification does not state the health and safety requirements for the subcontractor.

CC's: I R Lewis
C.A. Nelsal
A.J. Stewart

DOCUMENT NUMBER: ~~1.02~~

I-100-101-1.02

PCB Transformer Removal

In this case, more detail in the site characterization section of the text would be appropriate. For instance, the PCB transformers are catagorized as those containing PCBs at concentrations greater than 500 ppm. It may be somewhat misleading not to indicate in the text that the concentrations in these transformers are in excess of 350,000 ppm.

Disposal facilities under consideration for receipt of these wastes must provide certification that they meet the Superfund offsite policy.

Debris Consolidation

It is stated in the description of the response action that one of the response objectives is to "Perform a detailed chemical and radiological characterization of the debris...". The description of the response action and specifications document contain no guidelines, references or information which would allow the subcontractor to complete this objective.

More specifics regarding the handling, storage and ultimate disposal of radioactive contaminated waste are needed.

If there are any questions, please do not hesitate to call.

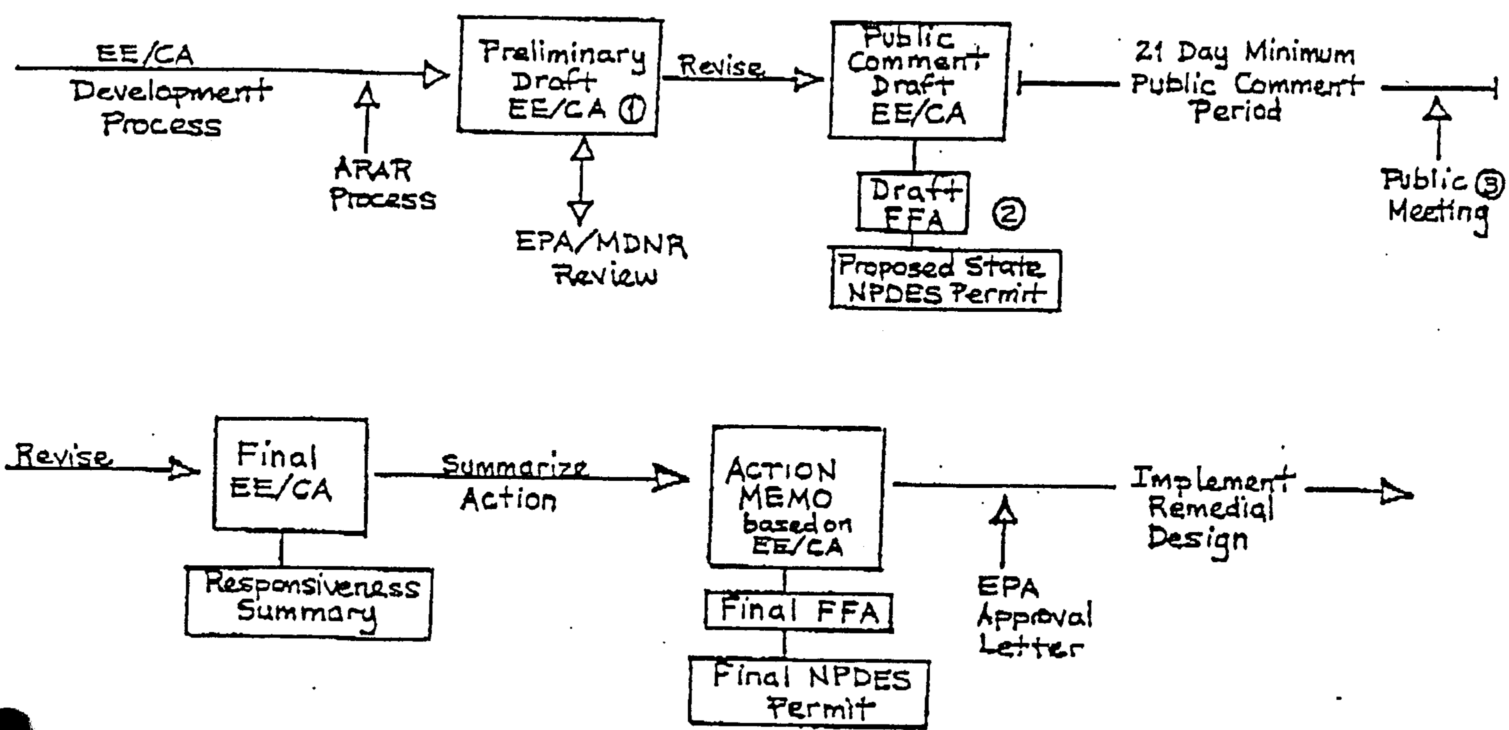
Sincerely yours,

Katie

B. Katherine Biggs
Chief, Environmental Review Branch

cc: Dave Bedan, MDNR

PROCESS FLOW CHART FOR DOE'S PROPOSED WASTEWATER TREATMENT AT THE WELDON SPRING SITE



1. Effluent limits are proposed by DOE based on BAT and/or ARARs.
2. It would be desirable to make the FFA and NPDES permit (if necessary) available for public comment along with the EE/CA.
3. Timing of the public meeting can vary; however it is desirable to hold it after the EE/CA is made available for public comment so that it provides an opportunity for oral comment.

DRAFT

DOCUMENT NUMBER: I-100-101-1.02(a)

IRA-100-102

WSSRA PROJECT REVIEWS AND APPROVALS

Subject: WSSRA PROJECT - CP
Specification Section 02090
Removal of Electrical Transformers

5121-C:SP-S-01-0217-01
(DOCUMENT NO.)

	Signature	Date
Prepared:	J. Eanes	5-19-87
Reviewed:	DW Reppond	5-19-87

Approved, MKE:		
- Site Design Engineer	DW Reppond	5-19-87
- Engineering & Design Manager	Philip R. Thuener	5-19-87
- Chief Engineer, ESC Division	J. L. Jordan	22 May 87

QA Compliance PLC 5-22-87

- PMC Engineering Manager D K Lewis 6/17/87

Q.A. REVIEW
ENTRY NO. N/A
INIT JJH DATE 6/18/87

DOCUMENT NUMBER: I-100-102-1.01

SECTION 02090

REMOVAL OF ELECTRICAL TRANSFORMERS

Q.A. REVIEW
ENTRY NO. N/A
INIT. JH DATE 4/29/87

PART 1 - GENERAL

1.1 SCOPE

A. The work required to be performed under this Subcontract consists of controlled removal and disposal of selected electrical switches, transformers and capacitors from the project site, including many which are polychlorinated biphenol (PCB) containing or contaminated.

B. The Subcontractor shall furnish all labor, supervision, materials, analysis, equipment, and transportation necessary for the complete removal and disposal of PCB contaminated fluid, three existing drums of previous PCB-contaminated sampling materials, electrical equipment with contents and subsequent contaminated materials resulting from cleanup operations. The electrical equipment consists of thirty-seven switches and transformers with capacitors located on concrete pads, mounted on poles, and one rooftop around the site. Three non-PCB containing transformers have a PCB contaminated capacitor attached. The capacitors are to be removed from the site as part of this contract. All electrical transformers, switches, and capacitors to be removed or drained are listed and located on project Drawing No. 5121E-CP-583.

1.2 CODES AND REGULATIONS

A. All work on this Subcontract shall comply with applicable codes and regulations including, but not limited to, the following:

1. Environmental Protection Agency (EPA)

   - 40 CFR 761

   - 15 USC 2601 et. seq. (TSCA)

2. U. S. Department of Labor, Occupational Safety and Health administration (OSHA)

- 29 CFR 1926
- 29 CFR 1910

B. Posting Regulations: Where required by regulations, copies of applicable EPA and OSHA regulations shall be obtained by the Subcontractor and posted at the job site.

1.3 HEALTH AND SAFETY

A. Training: All workers shall have received a forty-hour course per 29 CFR 1910.120 covering the following: health and safety regulations; environmental regulations; use and fitting of respiratory protective equipment; use of other personal protective equipment; procedures for work, spill, transport, disposal and decontamination.

B. The Subcontractor shall provide all workers with personal protective equipment accepted by regulatory standards. This equipment shall generally include: Respirator per 29 CFR 1910.134; Full Saranex-Tyvek coveralls; PCB permeation resistant gloves and boot covers; goggles or face splash shield.

1.4 SUBMITTALS

A. Work Plan:

The Subcontractor shall submit a detailed plan of the work schedule and procedures to be used in removing the electrical equipment. The plan shall include details concerning sequencing, oil draining and flushing procedure, methods for removing the carcass from mounting structure, transportation to disposal, final disposal and procedures for chain of custody confirmation. The Subcontractor shall meet with the Contractor prior to beginning work to discuss and obtain acceptance of the Plan.

PART 2 - PRODUCTS

(None)

PART 3 - EXECUTION

3.1 WORK PRACTICES

A. All PCB contaminated transformers whose volume prohibits placement in a 55-gallon DOT 17H drum, shall be drained and flushed on-site prior to shipment to an EPA-approved facility. Those transformers which can be shipped in drums may be transported undrained only if the EPA-approved facility is capable and intends to incinerate the oil, transformer and drum as a unit. If transformers are transported intact, the transformers shall be secured against overturning and a spill containment system provided.

B. PCB contaminated liquids may be transported by either Department of Transportation (DOT) bulk container or DOT approved drum containers.

C. Transformers drained on-site shall be flushed with non-PCB-contaminated Kerosene and rinsed in accordance with 40 CFR 761.60(b)(1)(i)B. During connecting and disconnection of hoses, spill collection pans shall be positioned to capture any liquid drips.

D. Preparations for Handling PCBs: Barricade area to keep out unauthorized personnel. Construct a temporary holding area for drums and empty equipment; cover the floor and spill berm with polyethylene. Protect the polyethylene floor with a protective covering such as plywood. The holding area shall be leak-proof. Protect all surfaces over which PCB will be transported with polyethylene sheeting and spill berms. Seal all floor drains. All polyethylene sheeting shall have 6 mils minimum thickness.

E. Any contaminated spill shall be immediately cleaned up in accordance with 40 CFR 761 Subpart G.

F. Subcontractor shall verify that electrical equipment is de-energized prior to proceeding with any work.

3.2 DISPOSAL

A. Transport and disposal shall be in accordance with all Federal, State and local laws and regulations.

B. PCB Containing Oil: Oil which is 50 parts per million or more PCB shall be drained from the equipment, taking care to avoid spills, drips and splashes. The thoroughly drained equipment shall be rinsed as required by 15 USC 2601 et. seq. (TSCA).

C. The drained oil and rinse solution shall be properly labeled and sent for disposal at an EPA-approved PCB incineration facility. The drained and rinsed equipment shall be placed in a leak tight package, consisting of PCB impermeable plastic and wooden crating. The crated equipment shall be properly labeled and sent for disposal at an EPA-approved PCB facility.

D. PCB-Containing Transformers: Transformers containing PCB contaminated oil shall be properly packaged and transported directly to an EPA approved PCB disposal facility.

E. Waste Tracking: The Subcontractor shall establish and maintain a waste tracking system which shall as a minimum contain the following information: equipment identification, volume of oil, PCB contamination level, drum number (if any), date filled, date transported, manifest number, transporter, vehicle, destination and date arrived at destination for disposal and a letter of destruction.

F. All PCB containing and contaminated oil and all equipment which was filled with PCB-contaminated oil shall be accompanied in transport by an EPA uniform hazardous waste manifest. If the PCB waste is being disposed of in a state which has more stringent manifesting requirements, a state manifest may be substituted.

G. Non PCB oil shall be drained, removed from site and incinerated.

H. All PCB containing and contaminated oil and all equipment which was filled with PCB containing oil shall be transported to the disposal site by a transporter licensed by the Missouri Department of Natural Resources.

END OF SECTION 02090

IRA-100-103

3589-87-I-DOE-177

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

October 16, 1987

M-K FERGUSON CO.
RECEIVED
OCT 20 1987
WSSRAP CONTRACT 3589

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed are six (6) copies of the documentation for the following four (4) Interim Response Actions:

1. Dismantling of Building 401
2. Dismantling of Building 409
3. Removal of PCB Transformers
4. Debris Consolidation

In addition, we are sending under separate cover, six (6) copies of the technical specifications and drawings from each of the four (4) proposed bid packages.

It is our intention to have copies of these documents in place in the repositories for public inspection, and to provide public notice of their availability on October 19, 1987. This will initiate the twenty one (21) day comment period.

If you have any questions, please give me a call.

Sincerely,

J H McCracken
for Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosures:
As stated

cc w/enclosures:
D. Bedan, MDNR

REMOVAL OF PCB TRANSFORMERS

Site Background

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metal were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. The buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the Ordnance Works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE. Currently, more than 70 inactive electrical transformers and switches are located in buildings and on external pads and poles throughout the Weldon Spring site.

Site Characterization

In order to characterize the potential hazards related to contamination by polychlorinated biphenyls (PCBs) at the Weldon Spring site, a sampling effort was conducted during March and April of 1987 to determine the types, locations, capacities, and levels of PCBs associated with transformers and switches. Sampling locations are shown in Fig. 1. Based on the results of this survey, on-site transformers and switches are grouped in Table 1 according to the EPA classification system for PCB-containing articles, as specified in 40 CFR Part 761.

Four on-site transformers were not sampled and therefore were not classified. Two were not sampled because of their proximity to energized electrical lines; the third was not sampled because it belongs to St. Charles County Water and is still in service; and the fourth was overlooked during the survey because it was lying on its side in the grass adjacent to Storage Building 436. Up to 76 liters (20 gallons) of PCB-containing dielectric fluid could be contained in this transformer.

Inspection of 31 other transformers indicated that they are air-cooled models. Follow-up surveys identified a number of additional air-cooled switches and transformers within scattered buildings and on the roof of Laboratory Building 407. These

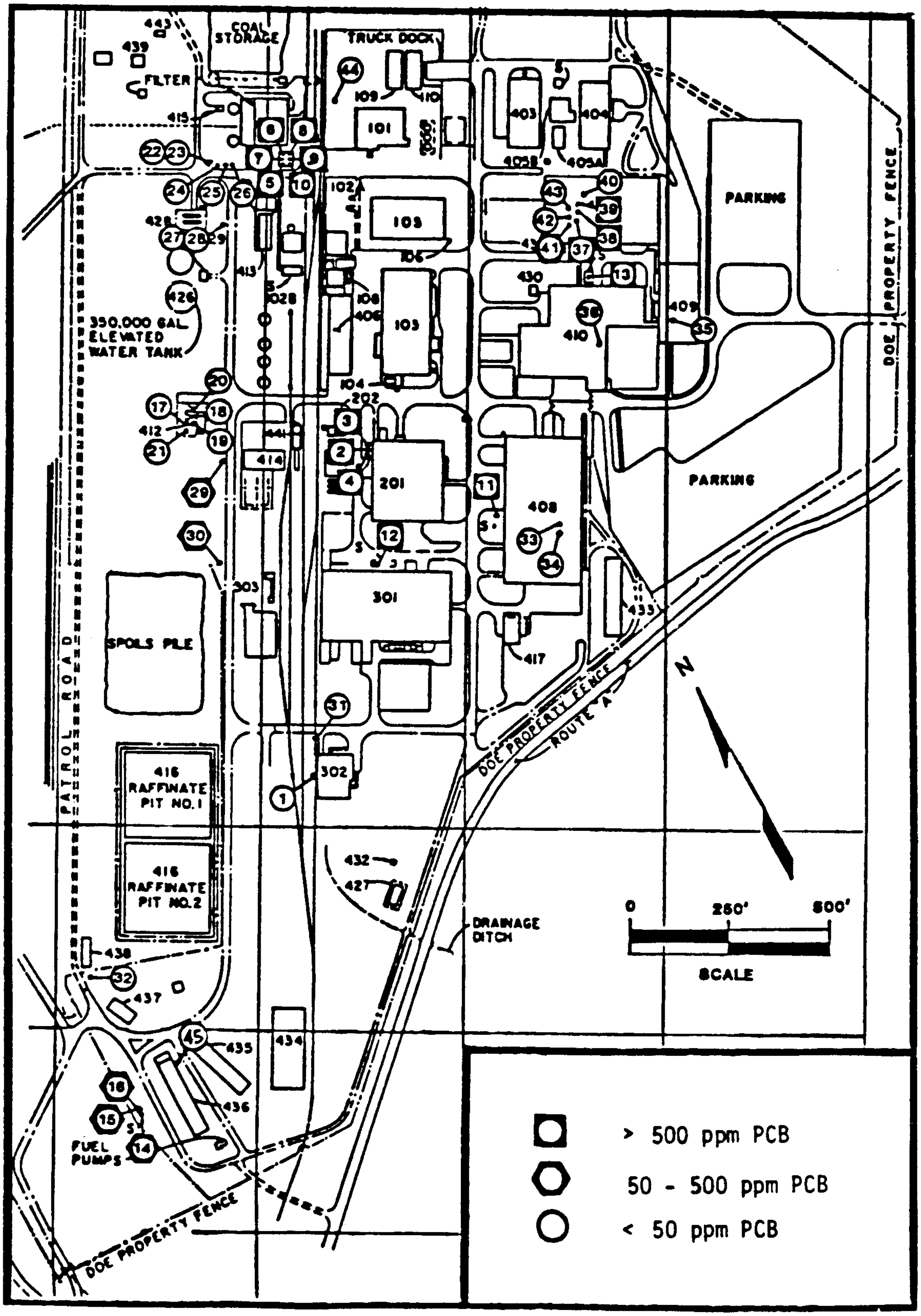


FIGURE 1 PCB Sampling Locations and Concentrations (Source: Modified from MK-Ferguson and Jacobs 1987)

TABLE 1 Summary of PCB Classification for Oil-Cooled Transformers and Switches at the Weldon Spring Site

Equipment	PCB Level (ppm)	Number	Estimated Volume Liters	Estimated Volume Gallons	Type of Mounting
PCB transformer	>500	12	20,810	5,370	Pad
PCB switch	>500	3	2,910	750	Pad
PCB-contaminated transformer	50-500	5	1,290	334[a]	Pad(3), pole(2)
PCB-contaminated switch	50-500	1			Wall
Non-PCB transformer	<50	12	29,740	7,675[a]	Pad(5), pole(7)
Non-PCB switch	<50	2			Wall

[a]Represents combined volume from transformers and switches.

Source: Data from Meyer (1987).

transformers contain no dielectric fluids and therefore do not contribute to the potential PCB hazard on-site. In addition, none of the transformers recently installed to support the remedial action program contain PCBs because they were installed after PCB control regulations became effective.

As part of the effort to characterize on-site electrical equipment, an extensive radiological survey was conducted to determine whether the transformers and switches would meet residual surface contamination guidelines for unrestricted off-site disposal. Results of the survey indicate that all equipment meets DOE criteria for unrestricted release (MK-Ferguson and Jacobs 1987).

Threat to Public Health and the Environment

A public health and environmental hazard exists at the site due to the presence of abandoned electrical transformers and switches. The equipment has begun to show signs of deterioration that could result in leakage of PCB-containing oils. If this equipment remains on-site, its continued deterioration could result in a significant exposure hazard to site personnel. In addition, the safety of workers could be threatened by the deterioration of associated structural equipment (e.g., mounting supports).

Response Objectives

The objectives of this response action are as follows:

1. Reduction of the potential health hazard due to the presence of PCB-containing oils in electrical equipment on the Weldon Spring site; and

2. Removal of the potential safety hazard associated with structural deterioration of the equipment.

Proposed Response Action Alternatives

Interim response actions are designed to ensure the health and safety of on-site personnel and to minimize or preclude off-site releases of contamination. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., actions will be limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

Alternative response actions identified for inactive electrical equipment on the Weldon Spring site are:

1. No action;

2. Transport of intact switches and transformers off-site to a licensed treatment/disposal facility;

3. Draining and flushing of switches and transformers, and on-site storage of the empty units, PCB-containing oils, and flushing solutions;

4. Draining and flushing of switches and transformers, on-site storage of the empty units, and transport of PCB-containing oils and solutions off-site to a licensed treatment/disposal facility; or

5. Draining and flushing of switches and transformers, transport of the empty units off-site to a licensed landfill, and transport of PCB-containing oils and solutions off-site to a licensed treatment/disposal facility.

Analysis of Alternatives

Alternative 1 affords no reduction in potential threats to the health and safety of on-site personnel posed by PCB-containing electrical equipment at the Weldon Spring site. There would be no improvement in environmental conditions at the site if no action were taken. This alternative presents no technical barriers and costs nothing in the short term. However, the equipment is scheduled for eventual disposal. The costs associated with deferred disposal would be higher than those for disposal at the current time, due to monitoring and maintenance activities required until future disposal. Most importantly, Alternative 1 is effectively precluded by institutional factors related to the community's strong desire for timely response actions at the Weldon Spring site.

Alternatives 2 through 5 are all technically feasible. Alternative 2 would be neither environmentally desirable nor cost-effective. Not only would there be an increase in costs related to the receiving facility, but bulk transport of the full containers would be less environmentally efficient than separation of hazardous from nonhazardous materials prior to treatment/disposal. In addition, the packaging, loading, transport, and unloading of the deteriorating equipment would entail considerable expense and effort to ensure minimization of the exposure threat to workers and the potential for PCB releases to the environment. Although the costs associated with Alternative 3 would be lower in the short term, this alternative would prove more expensive than Alternative 4 or 5 in the long term due to the monitoring and maintenance activities necessitated by controlled on-site storage of PCB-containing material. More importantly, Alternative 3 would be less desirable with regard to potential health and environmental effects than Alternative 4 or 5 because the PCB-containing fluids would remain on-site. Alternatives 4 and 5 are both environmentally effective because each would involve the off-site transport of these fluids. Even though Alternative 4 would be less expensive than Alternative 5, it is not consistent with DOE's intention to dispose of all nonradioactive waste off-site. In addition, Alternative 4 does not fully address the public sentiment for expedited response action at the Weldon Spring site. Therefore, following the screening and analysis process for interim response action alternatives, Alternative 5 has been identified as the preferred alternative.

Description of Proposed Action

The proposed interim response action involves the following operations.

1. Draining PCB-containing oils from on-site switches and transformers;

2. Flushing switches and transformers with an equal volume of a kerosene (or equivalent) solution;

3. Transporting the cleaned switch and transformer units off-site to a licensed facility; and

4. Transporting the PCB fluids and flushing solutions off-site to a licensed treatment/disposal facility.

The flushing and removal of PCB-containing electrical equipment from the Weldon Spring site will be performed in compliance with all applicable regulations and procedures. This compliance will minimize the potential health threat to on-site personnel associated with exposure to PCBs and will also remove the safety hazards associated with the deteriorating electrical equipment. In addition, removal of the equipment will preclude the potential release of PCBs and will thus improve environmental conditions at the site. Finally, the proposed response action is consistent with DOE's goal to remove hazardous waste from the site.

The waste volumes associated with this effort are estimated to be 400 m^3 (500 yd^3) of rinsed equipment and a combined volume of 109,500 liters (28,260 gallons) of PCB-containing oils and flushing solutions.

References

Meyer, K., 1987, *Transformer Sampling for PCB Fluids*, prepared for MK-Ferguson Company, Weldon Spring, Mo. (April).

MK-Ferguson Company and Jacobs Engineering Group, 1987, *Radiological Survey Report for the Transformers at the WSS*, prepared for U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tenn. (Sept.).

U.S. Atomic Energy Commission, 1960, *Expansion Program at St. Louis Area - Project No. 224-5066A - Project History and Completion Report*, Oak Ridge Operations Office, Oak Ridge, Tenn. (Oct.).

IRA-100-104

Copy to:
Rod
Steve
Bill
Glen
Ken
J. Coyne

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

November 13, 1987

M-K FERGUSON CO.
RECEIVED
NOV 30 1987
WSSRAP CONTRACT 3589

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. ~~Nelson~~ Rod:

Enclosed is a copy of the comments we received from the Missouri Department of Natural Resources for the following four interim response actions:

1. Dismantling of Building 401,
2. Dismantling of Building 409,
3. Removal of PCB Transformers, and
4. Debris Consolidation.

Any questions on these comments should be directed to David Bedan. To date, we have not received any other comments.

Sincerely yours,

Katie

B. Katherine Biggs
Chief, Environmental Review Branch

Enclosure

cc: David Bedan

001893
11-30-87

DOCUMENT NUMBER: I-CC-104-1.01

Cynthia ... 76761 ...

JOHN ASHCROFT
Governor

FREDERICK A. BRUNNER
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176
Jefferson City, MO 65102

Division of Energy
Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Division of Parks, Recreation, and Historic Preservation

November 12, 1987

Katie Biggs
Environmental Review Branch
U.S. EPA, Region VII
726 Minnesota Avenue
Kansas City, KS 66101

Dear Ms. Biggs:

The Missouri Department of Natural Resources has reviewed four interim response actions (Group II) which the U.S. Department of Energy (U.S. DOE) has proposed for the Weldon Spring Site. These actions are:

1) Dismantling and Disposal of Building 401

2) Dismantling and Disposal of Building 409

3) Removal of PCB transformers

4) Debris Consolidation

MDNR supports the concept of interim response actions if they improve safety conditions or the environment, facilitate later remedial actions, and do not prejudice the decision on the final remedial action for the radioactive wastes. Based on the information provided by the U.S. DOE the MDNR concurs that these actions should be initiated immediately subject to the following comments and requirements:

1) Dismantling and Disposal of Building 401 and 409

These activities are subject to both the Missouri Air Conservation Law and the Missouri Solid Waste Management Law. Missouri has adopted the federal Clean Air Act Standards for asbestos handling and has been delegated responsibility for implementing these standards. The Department of Energy and its contractors should develop and maintain close contact with the Missouri Air Pollution Control Program to insure compliance with these standards.

The Missouri Department of Natural Resources also regulates the disposal of asbestos and other demolition wastes under the Missouri Solid Waste Management Law. Demolition waste is required to be disposed of in a state permitted sanitary or demolition landfill; asbestos waste is required to be disposed of in a permitted sanitary landfill.

76761

Ms. Katie Biggs
November 12, 1987
Page 2

Because of the special concerns relating to the volume of waste and to the possible contamination of the asbestos and the other demolition material with hazardous wastes or radioactive wastes, the Department has determined that these materials should be handled as "special wastes". "Special Wastes" means solid wastes requiring handling other than that normally used for municipal wastes. Since radioactive wastes and hazardous wastes are excluded from disposal in sanitary landfills and demolition landfills in Missouri, the Department of Natural Resources cannot approve the disposal of the asbestos and other demolition wastes until a procedure is in place to assure us that no radioactive or hazardous materials are being disposed of in Missouri solid waste landfills. Also of concern is the large volume of material to be disposed of. Therefore, when the specific landfill has been chosen for disposal of this material, the generator of the waste (DOE) and the operator of the landfill must jointly make application to the Missouri Department of Natural Resources for special waste disposal approval. Please contact the Waste Management Program for further information on the approval process. If the waste is to be disposed of in another state, DOE must document that the action is in compliance with the waste management laws of that state.

Alternative 4 (on-site disposal) is rejected because "it is not consistent with DOE's intention to dispose of all non-radioactive waste off-site". DOE should provide justification for this off-site disposal policy.

2) Removal of PCB transformers

MDNR recommends that if Alternative #5 is used, during the "flushing" process care should be taken to contain any spilled material. Also "flushing" should be continued until PCB levels are less than 2 ppm, if transformer and switch carcasses are going to be disposed into a permitted sanitary landfill.

If the PCB liquids are being transported to a facility within Missouri, a licensed hazardous waste transporter must be used. If the PCBs are being transported to an out-of-state facility, MDNR recommends that a licensed transporter be used although it is not a requirement.

In the preamble to 40 CFR 761, unless otherwise tested, all dielectic transformers are assumed to contain 50-500 ppm PCB, therefore, untested transformers (22, 32, & 45) should be "flushed" with other transformers.

External pad, poles, and adjacent areas should be tested to determine if PCB contamination exists.

76761

3) Debris Consolidation

The storage of solid waste on site may be subject to the requirements of the Missouri Solid Waste Management Law. Please contact the Missouri Waste Management Program for assistance in determining whether these requirements apply.

Please contact me if you have any questions on these comments.

Sincerely,

DIVISION OF ENVIRONMENTAL QUALITY

David E. Bedan

David E. Bedan
Weldon Spring Site Work Group Coordinator

DEB/jtw

cc: Ron Kucera, Deputy Director, DNR
Carolyn deRoos, Legal Counsel
William C. Ford, Director, DEQ
Nick Di Pasquale, Director, WMP
Nick Nikkila, Director, APCP
Don Maddox, SLRO
Bill Dieffenbach, MDOC
John Crellin, MDOH
Rod Nelson, WSSRAP, U.S. DOE

7240.2

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

NOV 18 1987

OFFICE OF
THE REGIONAL ADMINISTRATOR

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the interim response action for construction of the Ash Pond Dike. We will provide any comments on this proposed action within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay

Morris Kay
Regional Administrator

cc: Dr. Fred Brunner, MDNR

001872
11-23-87

4711

DEC 09 1987

CONCURRENCES

RTG SYMBOL PEER

INITIALS/SIG.

J. Coyne

DATE 12/7/87

RTG SYMBOL CE-541

INITIALS/SIG. RRN

R. Nelson

DATE 12/9/87

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of November 9, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR

PEER:JCoyne:x41:mw:12/04/87: (c:EPA-IRA'.Ltr.)

OFFICIAL FILE COPY

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated November 9, 1987 re:

Interim Response Actions

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

General

Comment: Generally, a more thorough analysis and screening of response alternatives would be appropriate.

Response: This comment was reviewed with the EPA (telecon from Rod Nelson to Dan Wall dated 11-17-87). The EPA agreed that while additional analysis and screening is not required for the four (4) IRA proposals addressed herein, future proposals such as the Ash Pond Isolation Dike will present a more thorough analysis of response alternatives.

Comment: The documents do not contain sufficient detail of the work to be done to stand alone without the support of the technical specifications and drawings.

Response: Technical specifications and drawings will continue to accompany the IRA proposal packages submitted for review.

Building Demolition

Comment: Specifics of handling, storage, and ultimate disposal of radioactively contaminated waste should be presented.

Response: Radioactively contaminated waste from demolition of Buildings #401 and #409 will be segregated and stored on-site in a dry, concrete floored building, Building #434 and/or Building #406. Ultimate disposal will be in accordance with the RI Plan/EIS. Specifics of handling this waste will be covered in the Contractor's operational work plan which will integrate the specification and drawings, the WSSRAP Construction Safety and Health Management Program, applicable WSSRAP Standard Operating Procedures and Plans along with the subcontractor dismantling plan. This work plan will be finalized prior to the Subcontractor(s) starting demolition work.

response,txtsheil

Comment: What guidelines will be used by the demolition subcontractor to determine the hazard potential of unknown materials encountered in the work?

Response: Subcontractor personnel who will work on the site will be required to undergo a minimum of 40 hours of initial instruction in hazardous waste operations prior to starting work on site in accordance with 29CFR1910.120. In addition Subcontractor personnel will receive indoctrination training in the known hazards in the work area prior to start of work in accordance with the WSSRAP Construction Safety and Health Management Program and Special Conditions requirement of the subcontract. Unknown (unidentified or unmarked) chemical substances encountered in the work shall be considered potential hazards and shall be reported to the Contractor in accordance with the requirements of the specifications.

The Contractor will also provide health physics, construction safety and industrial hygiene surveillance on a routine basis during all stages of the work. This will include inspections of all work areas to identify potential hazards. Where required, the Contractor will collect bulk samples to identify any unknown or suspected substances. The Contractor will also perform air monitoring, as necessary and prudent, to assess exposure levels of hazardous substances in the workplace.

Comment: The responsibility for determining whether a pollution condition has or will be created should be clearly specified.

Response: The WSSRAP Construction Safety and Health Management Program which is an integral part of site subcontracts assigns responsibility for the identification of potential pollution (environmental) conditions to the Project Management Contractor. The Subcontractor is contractually required to comply with the requirements of the Clean Air Act and the Clean Water Act.

Comment: The specification does not state the health and safety requirements for the subcontractor.

Response: Subcontractor health and safety requirements are defined in the Special Conditions to the subcontract. The Special Conditions bind the Subcontractor to compliance with the WSSRAP Construction Safety and Health Management Program and all applicable Federal, State, and local health and safety regulations and standards listed therein. The Special Conditions are a supplement to the General Conditions and General Provisions which also contain basic health and safety requirements.

PCB Transformer Removal

Comment: In this case, more detail in the site characterization section of the text would be appropriate. For instance, the PCB transformers are categorized as those containing PCBs at concentrations greater than 500 ppm. It may be somewhat misleading not to indicate in the text that the concentrations in these transformers are in excess of 350,000 ppm.

Response: The final subcontract work package includes a table on the subcontract drawings listing each electrical component in the scope of work. This table includes the PCB concentration and volume capacity, in gallons, of each electrical component.

Comment: Disposal facilities under consideration for receipt of these wastes must provide certification that they meet the Superfund offsite policy.

Response: The Work Plan specified in Section 1.2A of Specification Section 02090 includes provision for meeting all requirements of 40CFR761. The Subcontractor's Work Plan in section 1.4A will be required to contain certification that the facilities selected for disposal of the waste material (1) have received written approval from the U. S. Environmental Protection Agency as required under 40CFR Part 761.70 or 761.75, as applicable, and (2) are not under a state or federal compliance order under CERCLA or RCRA.

Debris Consolidation

Comment: It is stated in the description of the response action that one of the response objectives is to "Perform a detailed chemical and radiological characterization of the debris...". The description of the response action and specifications document contain no guidelines, references or information which would allow the Subcontractor to complete this objective.

Response: This objective is to be completed by the Contractor and does not require any special activity by the Subcontractor. Radiological guidelines to be used by the Contractor in performing this characterization are as defined in Draft DOE Order 5480.11 and applicable WSS operating procedures. All debris will be visually inspected for potential chemical contamination. Where chemical contamination is observed or suspected, sampling and analyses will be performed to identify the characteristics of the chemical.

Comment: More specifics regarding the handling, storage and ultimate disposal of radioactive contaminated wastes are needed.

Response: Specifics of handling the radiologically contaminated debris will be finalized upon submittal of the Subcontractor's work plan. That plan will be integrated with applicable WSSRAP Standard Operating Procedures and Plans, the WSSRAP Construction Safety and Health Management Program, and the specifications and drawings. The debris will be consolidated for temporary storage in a materials staging area. Details of the materials staging area will be presented in a separate IRA under preparation. Ultimate disposal of radioactive contaminated debris waste will be in accordance with the RI Plan/EIS.

3589-87-I-DOE-241

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

December 21, 1987

M-K FERGUSON CO.
RECEIVED
DEC 29 1987
WSSRAP CONTRACT 3589

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

MDNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our responsiveness summary for the comments contained in Dave Bedan's letter of November 12, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

J H McCracken
for
Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR, w/enclosure
Jack Hammond, MK-F, w/o enclosure

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated 11-13-87 re: MoDNR comments on:

Interim Response Actions

1. Dismantling and Disposal of Building #401
2. Dismantling and Disposal of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

1. <u>Dismantling and Disposal of Buildings #401 and #409</u>

Comment: The DOE and its Contractors should develop and maintain close contact with the Missouri Air Pollution Control Program to assure compliance with Missouri Air Conservation Law and Missouri Solid Waste Management Law in carrying out these activities.

Response: The DOE and its subcontractor(s) will continue to keep the DNR Air Pollution Control Program office apprised of plans for work at the site involving removal, handling, storage, and/or disposal of asbestos materials.

Comment: Missouri Solid Waste Management Law requires demolition waste to be disposed of in a permitted sanitary or demolition landfill. Asbestos waste must be disposed of in a permitted sanitary landfill.

Response: The Specifications for this work will require that asbestos and other demolition debris be disposed of in accordance with the requirements of the Missouri Solid Waste Management Law.

Comment: DNR maintains that because of the special concerns relating to the volume of waste and to the possible contamination of the asbestos and the other demolition material with hazardous wastes or radioactive wastes, these materials should be handled as "special wastes".

Response: The DOE concurs that there are special circumstances that require handling of asbestos as "special waste". Specifications for the asbestos subcontracts contain this provision.

The pending subcontracts contain the "special waste" forms which will be included in the

subcontract work packages as matter of comity. Should subcontract efforts, cost or progress on these IRA's be impacted by this provision, the DOE will revisit this issue with the MDNR.

Comment: The DNR cannot approve the disposal of the asbestos and other demolition wastes until a procedure is in place to assure us that no radioactive or hazardous materials are being disposed of in Missouri solid waste landfills.

Response: Release standards are in place for controlling release of the rubble off site. Radiological survey and release plans will be developed for each work package involving removal and off-site disposal of materials to insure compliance with the standards.

Comment: DOE should provide justification for its policy to dispose of all non-radioactive building waste off site.

Response: The DOE policy is based on volume reduction and cost effectiveness. By disposal of nonradiological material in a sanitary or demolition landfill, there is a reduction in the amount of material (Volume Reduction) that will be encapsulated in any disposal cell. Secondly, costs for on-site disposal cells are high in comparison to disposal in sanitary or demolition landfills. Also, as an aside to the technical and cost effectiveness issues, the DOE currently has funding available. The site is still to be fully characterized and to delay demolition and disposal of clean materials would not allow these funds to be utilized and also would lead to overall slipping of the schedule.

2. Removal of PCB Transformers

Comment: MDNR recommends that if Alternative #5 is used, during the "flushing" process care should be taken to contain any spilled material. Also, "flushing" should be continued until PCB levels are less than 2 ppm, if transformer and switch carcasses are going to be disposed into a permitted sanitary landfill.

Response: The subcontract specifications for this interim response action include spill control provisions for draining and flushing operations. Spill control pans are specified to collect any spilled liquids. PCB transformers and other electrical

equipment which have been drained and flushed, as stated in the specifications, will be disposed of at an EPA approved PCB disposal facility, not a sanitary landfill.

Comment: If the PCB liquids are being transported to a disposal facility within Missouri, a licensed hazardous waste transporter must be used. If the PCBs are being transported to an out-of-state facility MDNR recommends that a licensed transporter be used although it is not a requirement.

Response: The specifications state that the transporter of the PCB liquids and drained electrical equipment shall be licensed.

Comment: In the preamble to 40 CFR 761, unless otherwise tested, all dielectric transformers are assumed to contain 50-500 ppm PCB, therefore untested transformers (22, 32, and 45) should be "flushed" with other transformers.

Response: The three transformers which have not been sampled for PCBs will be treated as PCB-contaminated units unless future sampling is performed to otherwise classify them as non-PCB transformers or PCB transformers. Irrespective of the classification, these units will be drained and flushed on site, unless the disposal facility intends to incinerate them as intact units, as indicated in the subcontract specifications.

Comment: External pad, poles, and adjacent areas should be tested to determine if PCB contamination exists.

Response: Additional sampling for PCB contamination, in areas from which the PCB-containing transformers and other electrical components are to be removed, is planned as part of future chemical characterization activities at the site.

3. <u>Debris Consolidation</u>

Comment: The storage of solid waste on site may be subject to the requirements of the Missouri Solid Waste Management Law. Please contact the Missouri Waste Management Program for assistance in determining whether these requirements apply.

Response: An interim response action proposal is being prepared which will present plans for materials staging and interim storage of solid waste on site. We will contact the Missouri Waste Management Program Office for assistance in determining applicability of the Missouri Solid Waste Management Law to this work.

IRA-100-105

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE IR-0200

TABLE OF CONTENTS

The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-200-201

Admin File 2L - IRA 2 Corresp v.1

3589-87-I-DOE-191

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

M-K FERGUSON CO.
RECEIVED
NOV 09 1987
WSSRAP CONTRACT 3589

November 9, 1987

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed are six (6) copies of the documentation for the construction of the Ash Pond Dike, including copies of the relevant portions of the technical specifications and drawings from the proposed bid packages.

It is our intention to have copies of these documents in place in the repositories for public inspection, and to provide public notice of their availability on November 10, 1987. This will initiate the twenty one (21) day comment period.

If you have any questions, please give me a call.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: D. Bedan, MDNR (6 copies)

FILE NUMBER: 3.2.200.201.1.01

CONSTRUCTION OF ASH POND ISOLATION DIKE

Site Background

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metals were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. The buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the Ordnance Works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE.

Ash Pond is located in the far northwest section of the Weldon Spring site and has the lowest surface elevation on the site (Fig. 1). Water in Ash Pond is recharged by intermittent surface runoff and overflow from the St. Charles County water tower, which is located on the Weldon Spring site (U.S. Department of the Army 1976). The watershed of Ash Pond includes the area around raffinate pits 1 and 2 as well as the western quarter (about 25 ha [62 acres]) of the chemical plant area. Discharge from Ash Pond flows northward to Lake 35, an impoundment on Schote Creek in the Busch Wildlife Area (U.S. Department of Energy 1987a). There is a hydraulic connection between the Ash Pond outflow and Burgermeister Spring, which is also located in the Busch Wildlife Area. Routine environmental monitoring of intermittent surface runoff resulting from precipitation events has identified substantial levels of uranium contamination in the runoff from Ash Pond.

Site Characterization

A preliminary radiological survey of the Weldon Spring site was performed in 1975. Analysis of water samples from Ash Pond indicated that the concentrations of radium, thorium, and uranium were less than their maximum permissible concentrations as specified in 10 CFR Part 20 (Jacobson 1976). (At the time of the survey, 10 CFR Part 20 was the appropriate regulation because control of the site was under cognizance of the U.S. Department of the Army.) Recent radiological sampling identified uranium

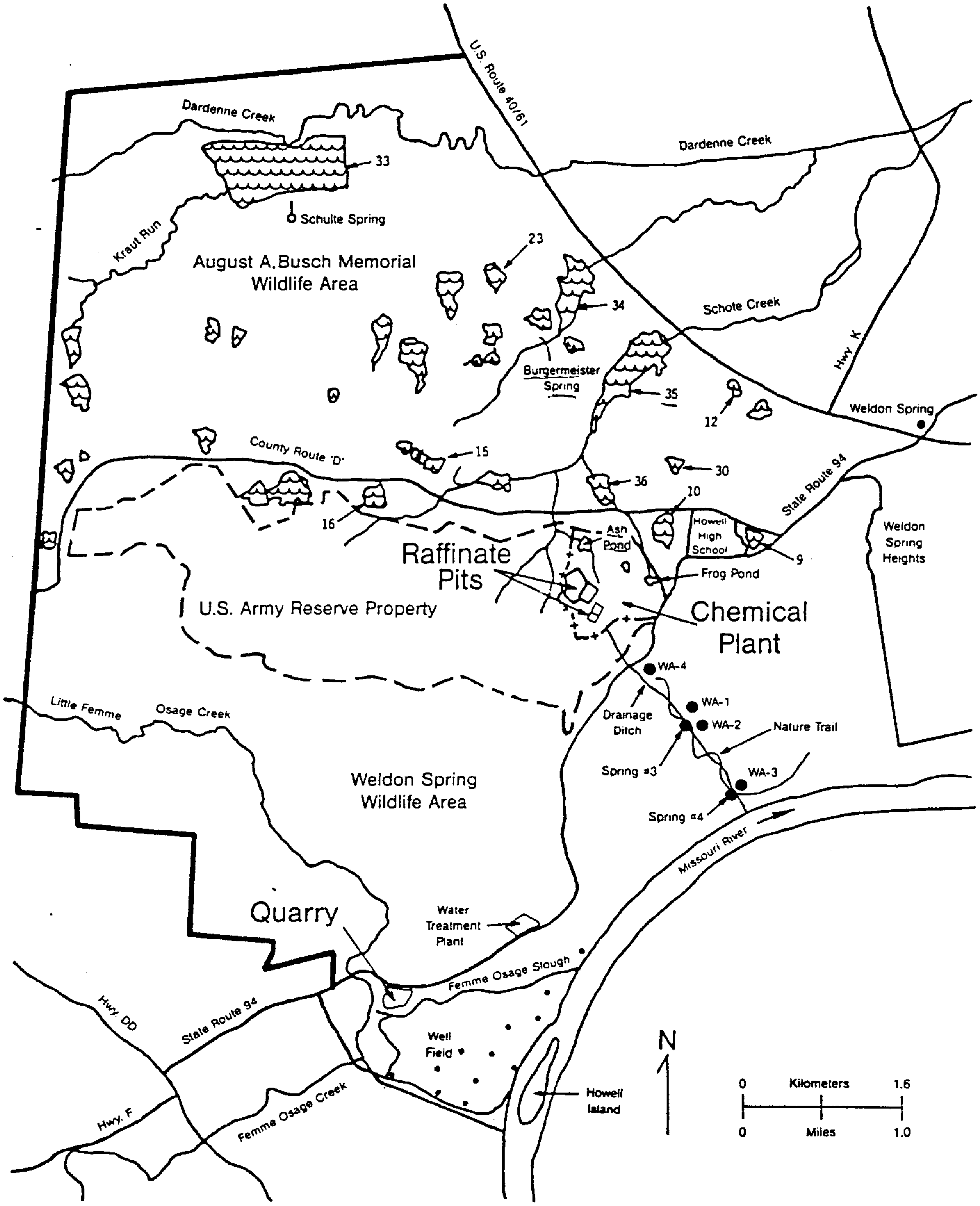

FIGURE 1 Map of the Weldon Spring Site and Vicinity (Source: Modified from U.S. Department of Energy 1987a)

concentrations as high as 4,000 pCi/L in surface runoff from Ash Pond and lower uranium levels of up to 400 pCi/L in surface waters upstream from Ash Pond (MK-Ferguson and Jacobs 1987).

A 1987 sampling of soils adjacent to Ash Pond identified the predominant radionuclides as radium and thorium. Contamination of soils in the Ash Pond area likely derives from previous processing activities at the site, radionuclide migration from a dump located adjacent to Ash Pond, and past discharges to the pond of decant liquids from the area between raffinate pits 1 and 3 (MK-Ferguson and Jacobs 1987). Background levels of radium-226, thorium-232, and uranium-238 — which were determined by sampling off-site locations — averaged 1.0, 0.8, and <1.9 (detection limit) pCi/g, respectively.

A more extensive sampling of surface and subsurface soils was performed in areas adjacent to Ash Pond that were identified as potential borrow areas for the proposed dike construction project (Fig. 2). Radionuclide concentrations in these soil samples ranged from 0.3 to 2.9 pCi/g thorium and from 0.3 to 7.2 pCi/g uranium. All thorium measurements are below applicable DOE guidelines for unrestricted release (U.S. Department of Energy 1987b), and the uranium concentrations are below preliminary values specified for release for unrestricted use. Chemical analyses of area soil samples identified background concentrations of metals and nitroaromatics and only slightly elevated nitrate and sulfate concentrations. Although no known chemical hazards currently exist in the area, additional confirmatory soil sampling is planned.

Threat to Public Health and the Environment

A health and environmental hazard exists at the site due to high levels of uranium contamination in the surface waters of Ash Pond. The contamination poses a similar hazard off-site because at least a portion of the outflow from Ash Pond, which enters the subsurface just west of the site boundary, surfaces again at Burgermeister Spring in the Busch Wildlife Area. Lake 35 in the wildlife area also receives water from Ash Pond (MK-Ferguson and Jacobs 1987). Contamination of Lake 35 and Burgermeister Spring poses a potential health hazard to area personnel, the general public, and resident wildlife.

Response Objectives

The objectives of this response action are as follows:

1. Reduction of the potential on-site health hazard due to radiation exposure associated with uranium contamination of surface water in Ash Pond;

2. Reduction of the potential off-site health hazard due to radiation exposure associated with uranium contamination of receiving waters in the Busch Wildlife Area;

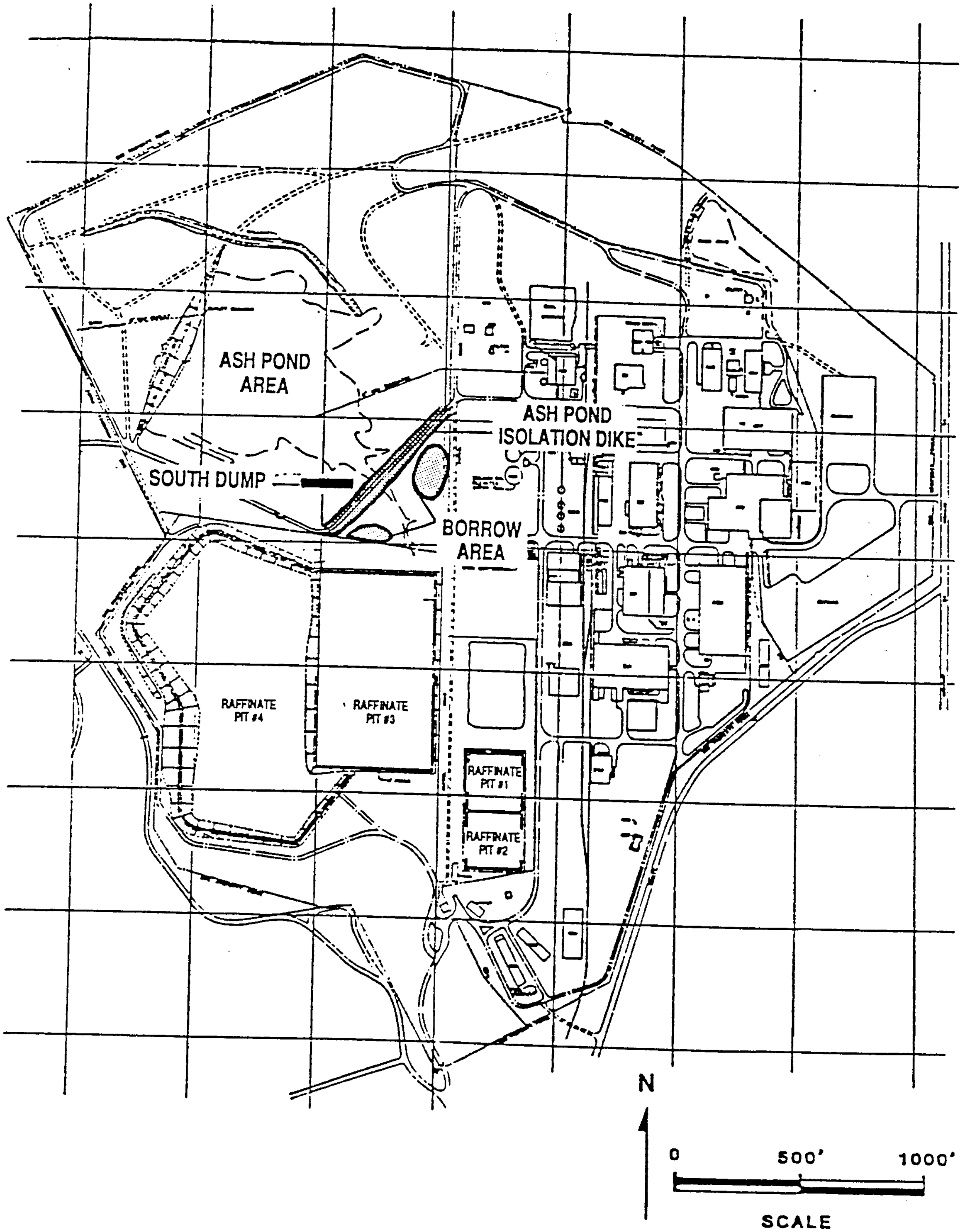

FIGURE 2 Location of Proposed Dike and Borrow Areas (Source: Modified from MK-Ferguson and Jacobs 1987)

3. Reduction of the potential for erosion and related resuspension and transport of the contaminated soils in Ash Pond;

4. Reduction of the surface water infiltration rate through contaminated soils in Ash Pond; and

5. Improvement in the quality of water being discharged from the site at Ash Pond.

Proposed Response Action Alternatives

Interim response actions are designed to ensure the health and safety of on-site personnel and to minimize or preclude off-site releases of contamination. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., actions will be limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

Alternative response actions identified for reducing radiological contamination of surface runoff from Ash Pond are:

1. No action;

2. Excavation of contaminated soils in the Ash Pond location that are responsible for radiological contamination of surface flow through the area, with on-site storage of all material that exceeds the radiological criteria for unrestricted release (and on-site interim storage of any material that exceeds limits for chemical contamination, prior to its eventual transport off-site to a licensed treatment/disposal facility);

3. Construction of a dike at the site boundary downstream of the Ash Pond area to provide a retention basin for the contaminated water until its subsequent decontamination at an on-site water treatment plant; and

4. Construction of an isolation dike upstream of Ash Pond to prevent contact of the surface runoff with contaminated soils in the Ash Pond area, construction of diversion channels to route the water away from these contaminated locations for subsequent discharge at its current point, and concurrent or subsequent excavation of the contaminated soils with on-site storage of all material that exceeds the radiological criteria for unrestricted release (and on-site interim storage of any material that exceeds limits for chemical contamination prior to its transport off-site to a licensed treatment/disposal facility).

Analysis of Alternatives

Alternative 1 affords no reduction in the potential health threat posed by uranium contamination of surface runoff from Ash Pond. There would be no improvement in on-site or off-site environmental conditions if no action were taken. Although this alternative presents no technical barriers and costs nothing in the short term, Alternative 1 is effectively precluded by institutional factors related to the community's demand for timely response actions at the Weldon Spring site — in particular, a reduction in the release of contaminants off-site.

Alternatives 2 through 4 are technically feasible and would reduce the potential hazards associated with uranium contamination of surface runoff. Alternative 2 would be less expensive than Alternative 3 or 4 because it would not include costs associated with dike and channel construction. However, the location and extent of radiological contamination in the Ash Pond area has not yet been determined. Characterization of this area would have to be performed prior to the initiation of any excavation effort. Therefore, Alternative 2 would not satisfy institutional factors related to the community's strong desire for expedited response with regard to minimizing off-site releases of radiologically contaminated water.

Excavation of radioactive soils in the Ash Pond area following construction of the isolation dike would be less feasible for Alternative 3 than Alternative 4 because the retention pond would cover these soils, at least intermittently. Delayed decontamination of the soil (and potential resuspension and/or leaching of uranium) would prevent Alternative 3 from being fully responsive to institutional issues related to the need for timely cleanup action at the site. Costs associated with deferred excavation, and with the subsequent decontamination of stored water in a water treatment plant, would cause Alternative 3 to be more expensive than Alternative 4. In addition, factors related to the desire for minimizing the potential for off-site contaminant releases would not be completely addressed by Alternative 3. Ponding of water above areas of contaminated soil would increase the likelihood of infiltration through these areas and the resultant transport of radionuclides into the groundwater. In comparison, Alternative 4 would involve diversion of surface runoff away from contaminated areas and would effectively reduce the hydraulic head at Ash Pond, thereby reducing the potential for contaminant transport into groundwater. Finally, Alternative 3 is precluded by institutional factors related to construction of the treatment plant, i.e., approval for its construction has not yet been granted by the appropriate federal, state, or local agencies, and it could be a long time before the plant is built. In addition, because the allowable levels of radioactive and chemical contaminants in the treated water have not yet been determined, it is not possible to estimate the date by which a water treatment plant would be operational.

Therefore, following the screening and analysis process for interim response action alternatives, Alternative 4 has been identified as the preferred alternative.

Description of Proposed Action

The proposed interim response action involves restriction of flow across Ash Pond by construction of an upstream dike and diversion channels. The response action will include the following operations:

1. Completion of the radiological and chemical characterization of the isolation dike area (radiological and chemical characterization of the remainder of the site will be performed at a later date following completion of the Soils Investigation Work Plan);

2. Construction of an isolation dike upstream of Ash Pond — measuring approximately 230 m (750 ft) in length and 3 m (10 ft) at its maximum height, containing about 5,400 m^3 (7,000 yd^3) of soil material, and creating a retention pond covering approximately 2.4 ha (6 acres);

3. Construction of diversion channels totaling approximately 610 m (2,500 ft) in length and measuring about 1 m (3 ft) in depth, which would circumvent Ash Pond and connect the dike to the current point of surface water discharge; and

4. Emplacement of a discharge monitoring station for intermittent measurement of water quality and continuous measurement of the quantity of surface water discharged from the Ash Pond area.

Under the proposed action, the dike and diversion channels will be constructed in full compliance with all applicable regulations and procedures. This compliance will ensure protection of the safety and health of on-site workers as well as limit off-site releases of contaminants. The proposed action would result in a decrease in the uranium concentration in discharged water from about 4,000 pCi/L to 400 pCi/L. The DOE uranium limit for water released off-site is 600 pCi/L. Hence, this action would reduce the uranium concentration in the water to levels below those allowed by DOE regulations. (The applicable limits to be used for the water treatment plant have not yet been determined.)

The dike and channels will be constructed of soil taken from adjacent borrow areas (Fig. 2), following final verification that the soil is neither chemically nor radiologically contaminated. (Characterization efforts to date have identified negligible contamination of this soil.) If the results of the surface water monitoring indicate unacceptable levels of contamination at the point of discharge, the water could be pumped to a raffinate pit in lieu of being released off-site.

This interim response action is being taken to reduce the concentration of uranium in water leaving the site. The contaminated areas responsible for this contamination will be remediated in the future. All material that exceeds the radiological criteria for unrestricted use will be transported to a dry, concrete-floored building currently located at the Weldon Spring site or to an on-site material staging area that may be constructed in the future. Material that exceeds the appropriate chemical contamination limits (to be developed), but is not radiologically contaminated, will be consolidated at an interim staging area on-site prior to its eventual transport off-site to a licensed treatment/disposal facility.

Implementation of the proposed response action at this time will minimize the potential adverse impacts on health and the environment resulting from continued runoff of highly contaminated surface water from the Ash Pond area.

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PROPOSED INTERIM RESPONSE ACTION:

CONSTRUCTION OF ASH POND ISOLATION SYSTEM
AT THE WELDON SPRING SITE

May 1988

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SITE BACKGROUND

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metals were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. Some of the buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the ordnance works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE.

The Ash Pond area is located in the far northwest section of the Weldon Spring site and has the lowest surface elevation on the site (Fig. 1). Water is present only intermittently in Ash Pond and is recharged by surface runoff. The watershed of Ash Pond includes the area around the raffinate pits and and the western quarter (about 25 ha [62 acres]) of the chemical plant area (Fig. 2). Discharge from Ash Pond flows northward to Lake 35, an impoundment on Schote Creek in the August A. Busch Memorial Wildlife Area (U.S. Department of Energy 1987a). Based on the results of dye studies conducted at the site by the Missouri Department of Natural Resources in 1983, a hydraulic connection exists between the Ash Pond outflow stream and Burgermeister Spring, which is also located in the Busch Wildlife Area (Dean 1985). Routine environmental monitoring of intermittent surface runoff has identified substantial levels of uranium contamination in the runoff from Ash Pond.

In order to decrease the release of contaminants off-site, it is proposed that an isolation system (e.g., a dike and diversion channels) be constructed upstream of Ash Pond to limit the flow of surface water over the contaminated area. This report documents the proposed Ash Pond construction project as an interim response action.

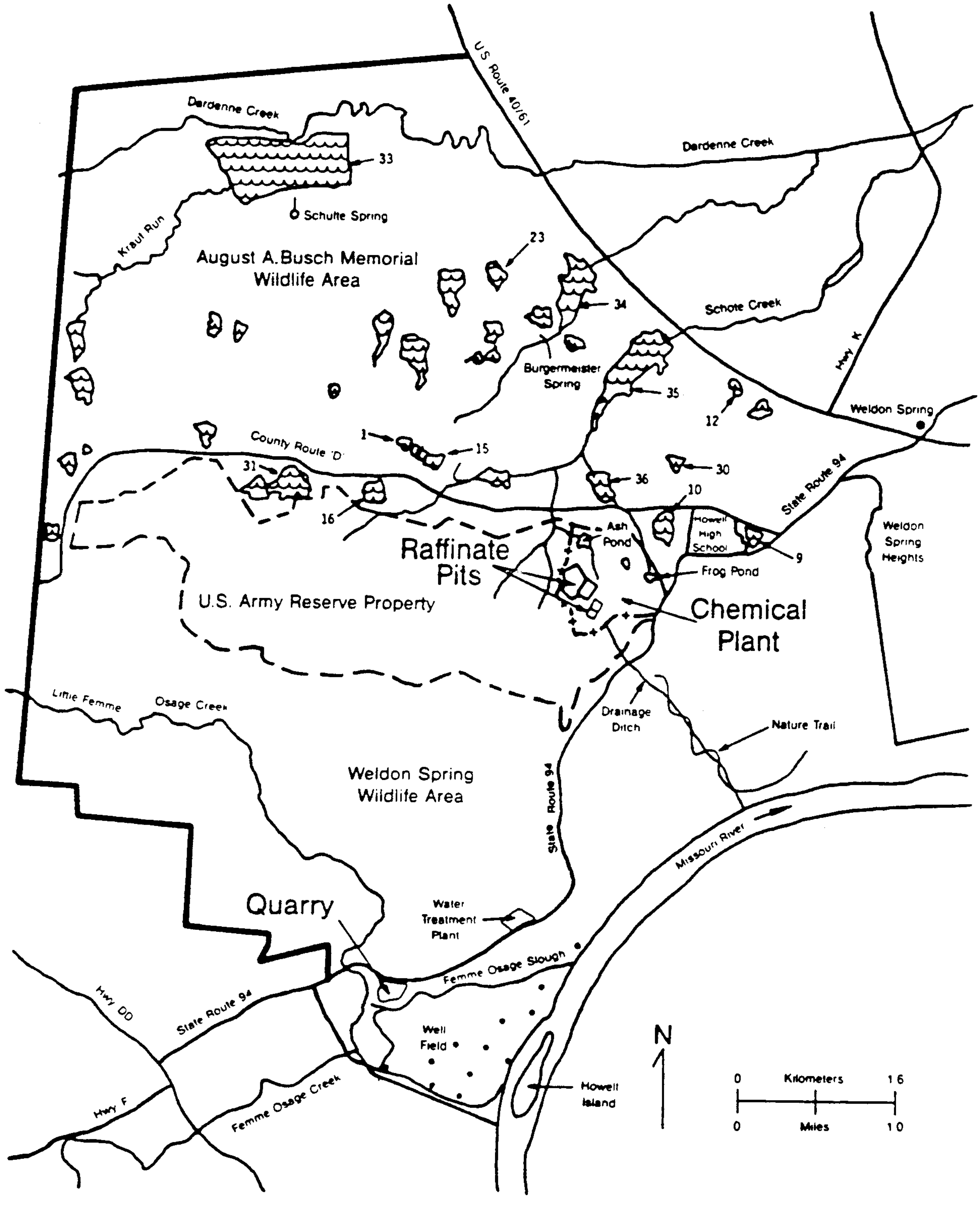

FIGURE 1 Map of the Weldon Spring Site and Vicinity (Source: Modified from U.S. Department of Energy 1987a)

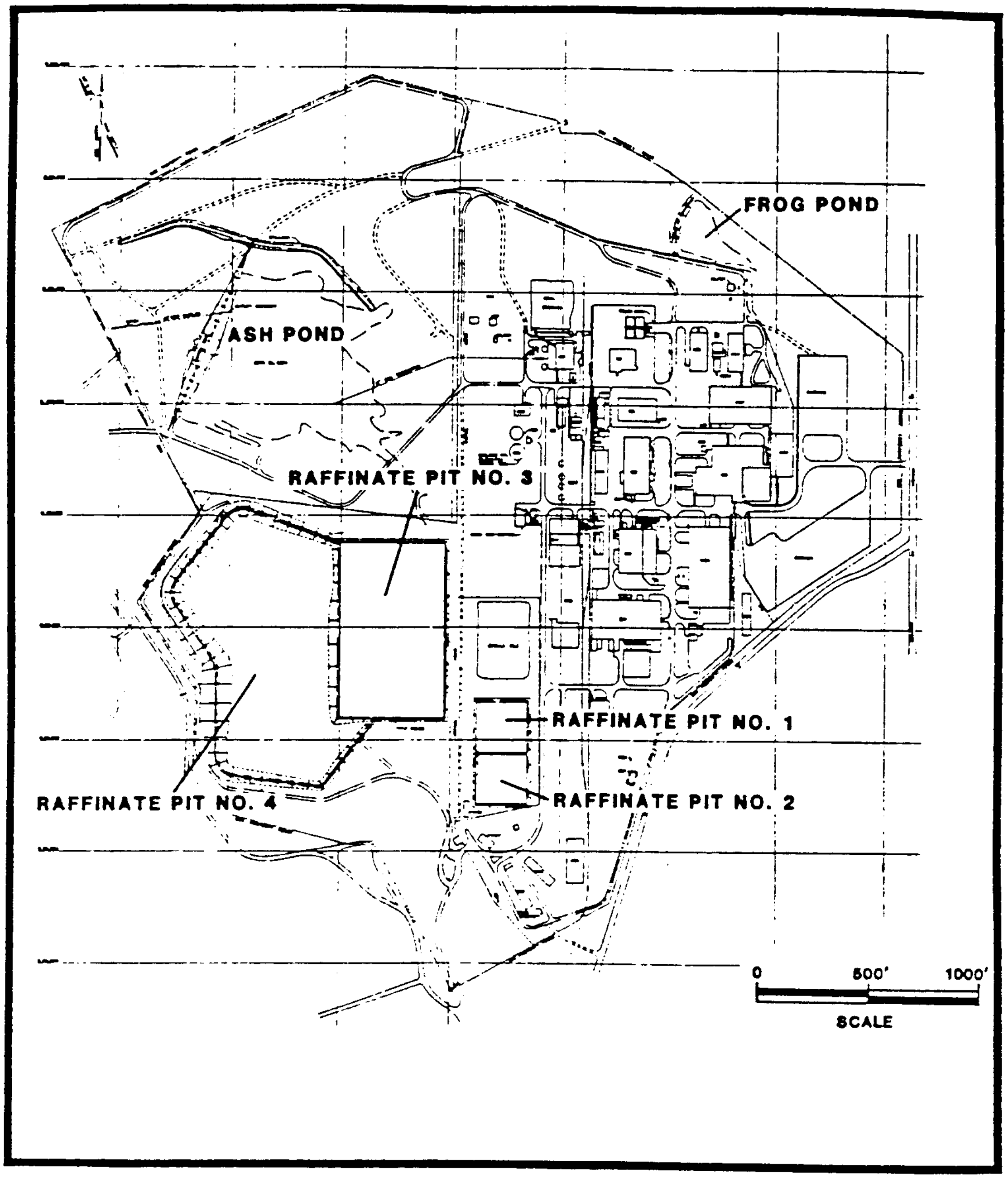

FIGURE 2 Layout of the Weldon Spring Raffinate Pits and Chemical Plant Area

SITE CHARACTERIZATION

Surface Water

A preliminary radiological survey of the Weldon Spring site was performed in 1975. Analyses of water samples from Ash Pond indicated that the concentrations of radium, thorium, and uranium were less than their maximum permissible concentrations (MPCs) as specified in 10 CFR Part 20 (Jacobson 1976; U.S. Department of the Army 1976). (At the time of the survey, 10 CFR Part 20 was the appropriate regulation because the site was under control of the U.S. Department of the Army.) Subsequent radiological sampling identified uranium concentrations in excess of the currently appropriate guideline, i.e., the DOE guideline for uranium-238 in water (600 pCi/L) (U.S. Department of Energy 1986). Levels as high as 4,000 pCi/L were detected in surface runoff from Ash Pond compared with levels up to 400 pCi/L in the watershed upstream from Ash Pond (Kleeschulte and Emmett 1986; MK-Ferguson and Jacobs Engineering 1987).

Recent characterization efforts at the Weldon Spring site have included more extensive sampling for uranium in surface runoff from the Ash Pond watershed. The locations of the sampling points, shown in Fig. 3, were selected because water passing between these points must cross over the known source of radioactive contamination in the watershed -- i.e., the South Dump, which was used for disposal of contaminated material during both the uranium-processing period and the Army's decontamination effort at the site.

Results of the runoff sampling program are presented in Table 1. Because rainfall during the months of April, May, June, August, September, October, and November 1987 was insufficient to produce any flow from the watershed, no water samples were collected during those months. The variable results reflect the nature of the sampling method (i.e., grab samples) and the variable flow volumes. To permit the level of contamination to be more accurately determined, procedures and equipment for continuous monitoring and sequential sampling of surface runoff leaving the area were recently put in place; this effort was completed during May 1988.

Geology and Groundwater

During a recent comprehensive characterization of the Weldon Spring site, several boreholes were drilled in and near Ash Pond (see Fig. 4) to define the physical nature of the area. Analysis of these borehole samples indicated that layers of low-permeability clay are present in the area, with thicknesses ranging from 1.5 to 6 m (5 to 20 ft). The thinnest deposits are present in the existing drainage channel, where compacted fill would be placed during the proposed construction project. A cross section of the Ash Pond area is presented in Fig. 5.

Two piezometers placed in the overburden material immediately south of the proposed dike indicate that the local soil is unsaturated. Groundwater in the area occurs

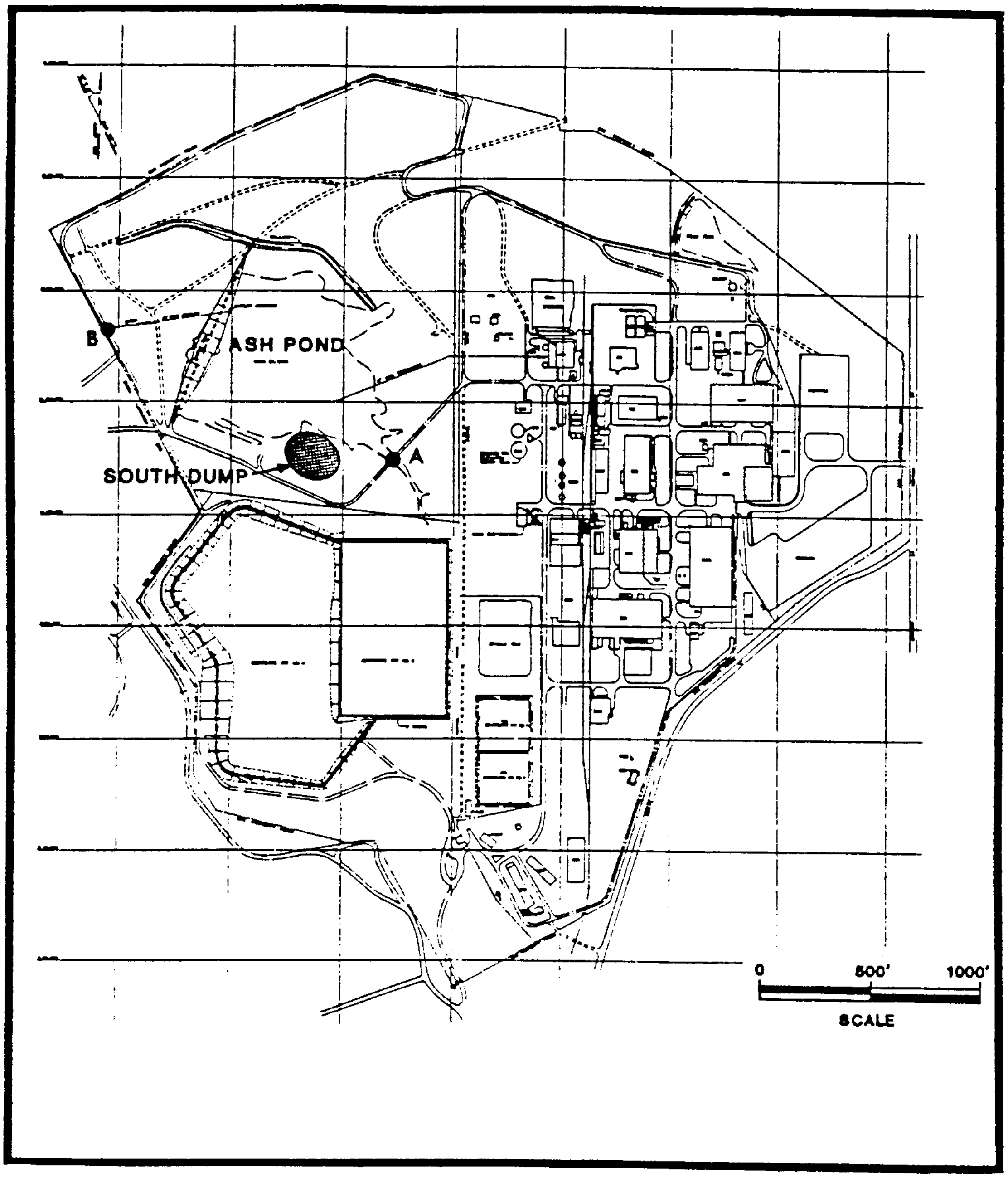

FIGURE 3 Sampling Locations for Uranium in Surface Water at Ash Pond

TABLE 1 Uranium Concentrations in Surface Runoff at the Ash Pond Sampling Points[a]

	Natural Uranium (pCi/L)			
	1987		1988	
Month	Point A	Point B	Point A	Point B
January	–[b]	3,500	140	2,700
			140	2,800
			45	1,800
			110	1,700
			200	360
February	-	3,100	100	460
			180	900
March	380	2,100		
July	100	250		
December	-	960		
	-	1,500		
	-	1,200		
	-	1,800		

[a]The locations of Point A (upstream) and Point B (site boundary) are shown in Fig. 3.

[b]A dash indicates that no data were collected.

in the bedrock, approximately 9 m (30 ft) below the ground surface. Groundwater recharge through this temporary impoundment would be minimal. However, should it occur, the underlying soils would be expected to adsorb contaminants and thus limit migration. (Soils in the area exhibit low hydraulic conductivity and favorable cation exchange properties.) In addition, the proposed upstream isolation dike and diversion channels would significantly reduce the amount of water entering the Ash Pond area, which is believed to be a shallow groundwater recharge area. The resultant decrease in hydraulic head would decrease the rate of infiltration through the contaminated locations in the Ash Pond area (e.g., the South Dump). Based on the thickness and nature of the soils in the affected area, the proposed Ash Pond dike and diversion system would not create a significant groundwater recharge zone. In addition, any water recharging the groundwater from this zone would contain lower levels of uranium than have been

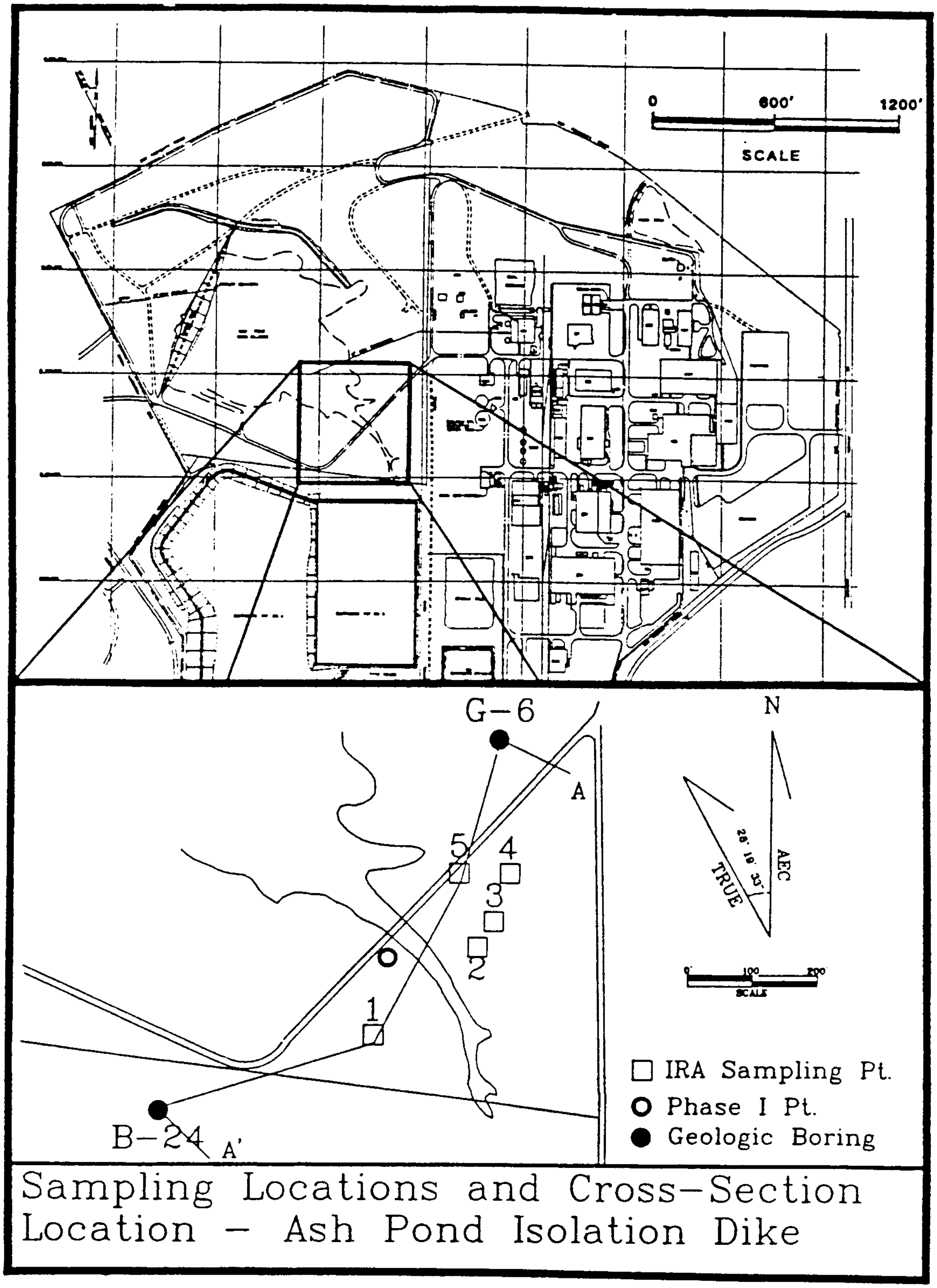

FIGURE 4 Location of Boreholes in the Ash Pond Area

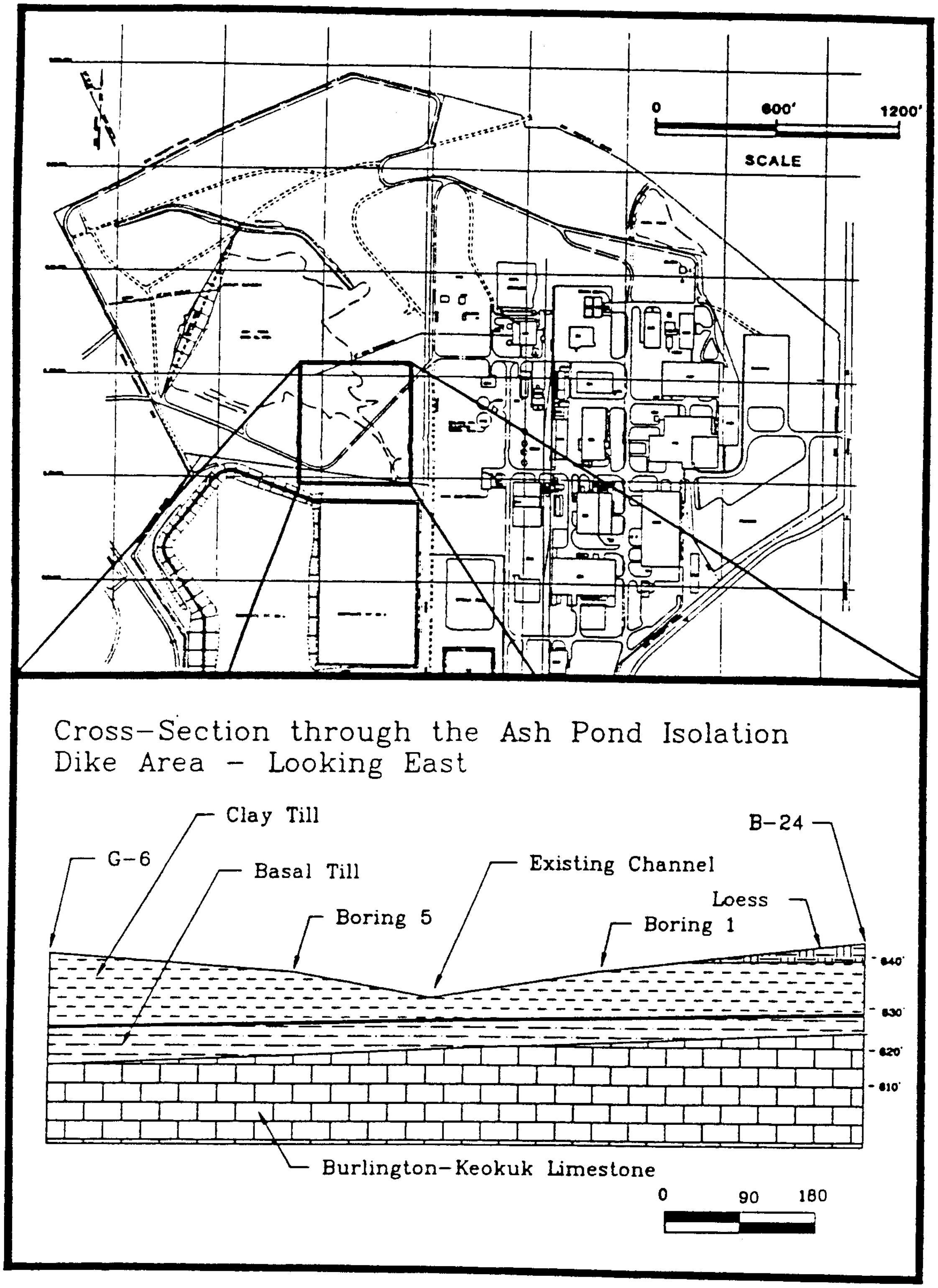

FIGURE 5 Geologic Cross Section of the Ash Pond Area

detected in the losing stream located immediately west of the site. Thus, an improvement in the quality of surface water leaving the Ash Pond area would also improve the quality of the subsurface system (MK-Ferguson and Jacobs Engineering 1988).

Soils

Soils in the Ash Pond area were probably radioactively contaminated as a result of previous processing activities at the Weldon Spring site, migration from the South Dump adjacent to Ash Pond, and past discharges to the pond of decant liquids from the area between raffinate pits 1 and 3 resulting from process line breakage. No known chemical hazards currently exist in the Ash Pond area (MK-Ferguson and Jacobs Engineering 1987).

The Phase I soil investigation program, consisting of a comprehensive radiological and chemical characterization of site soils, was recently completed at the Weldon Spring site (MK-Ferguson and Jacobs Engineering 1988). For the chemical characterization, subsurface soil samples were collected from several boreholes in and around the area proposed for the Ash Pond isolation system (see Fig. 4). These borehole samples Fig. 4) were analyzed for metals, nitroaromatics, inorganic ions (nitrate, sulfate, chloride, and fluoride), and moisture content. Select samples were also analyzed for semivolatile compounds, pesticides, and polychlorinated biphenyls. The results indicated that only nitrate and sulfate levels are slightly elevated, and no chemical hazards exist in the area proposed for the isolation system (MK-Ferguson and Jacobs Engineering 1988).

It is proposed that borrow material for construction of the Ash Pond isolation system be obtained from a spoils pile that is located north of raffinate pit 1 and east of raffinate pit 3 (Fig. 6). This pile probably resulted from the excavation of raffinate pit 4 and typically consists of clayey soils. The spoils pile was chemically characterized during the Phase I soil investigation program. Samples were collected from two locations in the pile and analyzed for metals, nitroaromatics, inorganic ions, and moisture content. No elevated concentrations of chemical contaminants were detected in the samples.

The Ash Pond and spoils pile areas were also surveyed for radiological contamination. The methods employed and values measured during this effort are described in detail in the radiological characterization report for the site (Marutzky et al. 1988). Sampling results for the spoils pile indicate that there is no uranium contamination and that concentrations of radium and thorium are below current DOE guidelines for residual radionuclides in soil (U.S. Department of Energy 1987b), which are provided in Appendix A. (Although DOE has established generic guidelines for radium and thorium in soil, there is no similar guideline for uranium. The guideline for uranium in soil is derived on a site-specific basis.) The pertinent results for the Ash Pond/South Dump area are summarized below.

The analyses of soil samples identified one area south of Ash Pond with a radium-226 concentration above the near-surface (i.e., upper 15 cm [6 in.]) soil guideline,

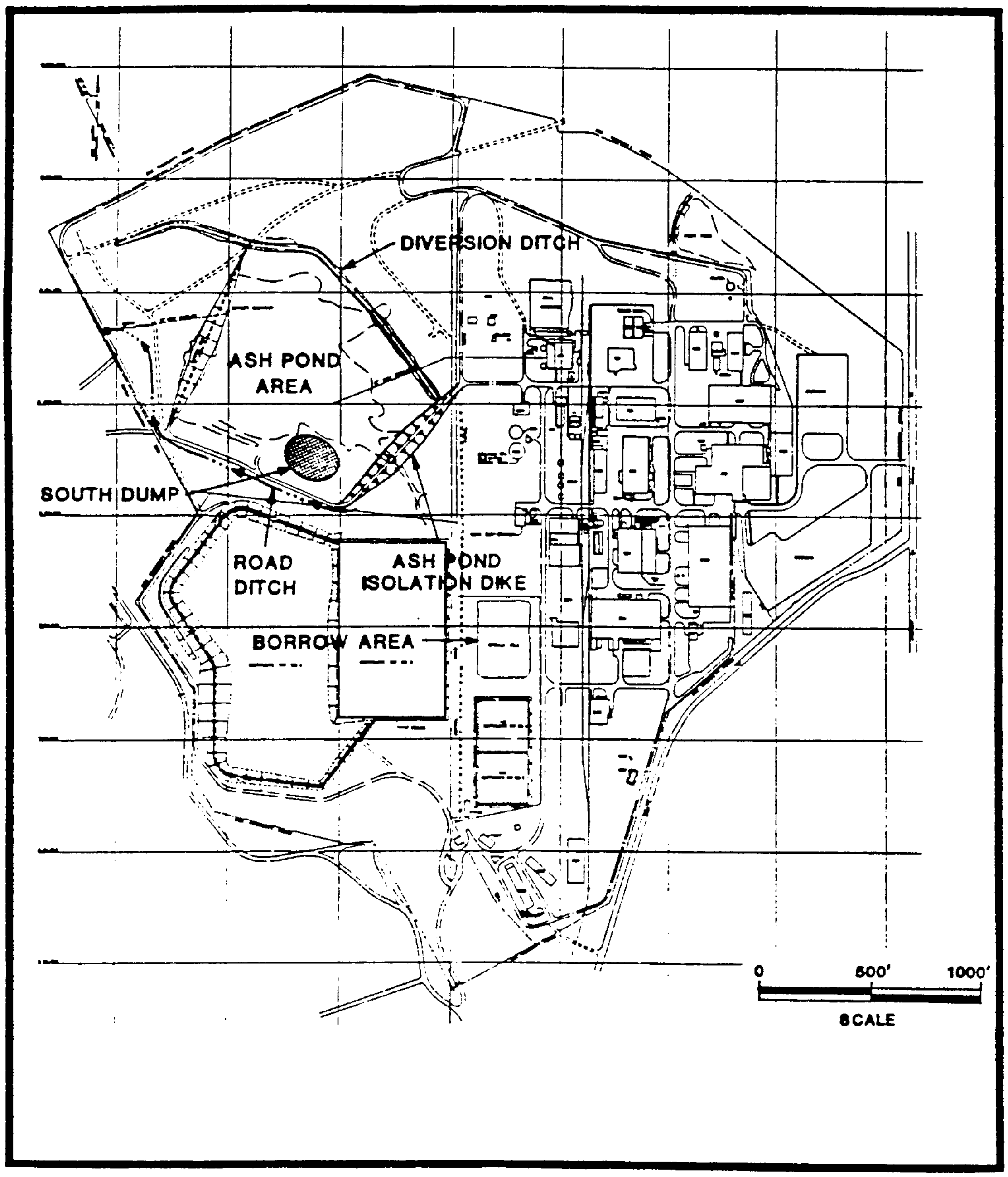

FIGURE 6 Location of Proposed Dike and Borrow Area (Source: Modified from MK-Ferguson and Jacobs Engineering 1987)

but there were no measurements above the guideline for thorium-232 in the area affected by the proposed isolation system. Uranium contamination was detected in the South Dump.

Spectrometric measurements identified two locations southeast of Ash Pond with radium-226 concentrations above the near-surface soil guideline, but no measurements of thorium-232 in the area exceeded the appropriate guideline. Exposure-rate measurements were above background levels in the South Dump.

The subsurface drilling and sampling effort identified the presence of elevated thorium-230 concentrations in the South Dump and elevated uranium concentrations in the Ash Pond/South Dump area. The near-surface soil limit of 5 pCi/g for thorium-230 was exceeded in the South Dump to a maximum depth of 1.2 m (4 ft).

Uranium was detected above 60 pCi/g at maximum depths of 1 m (3 ft) in the South Dump and at greater than 1 m (3 ft) in Ash Pond. Uranium concentrations of 15 pCi/g were detected to a maximum depth of 1.2 m (4 ft) in the South Dump and to a maximum depth of greater than 1 m (3 ft) in Ash Pond. In addition, of 217 boreholes drilled at the site, samples from only two boreholes drilled in the area of the proposed isolation system had radium-226 concentrations above the near-surface soil guideline of 5 pCi/g. A sample from the borehole located east of Ash Pond had elevated radium concentrations to a depth of 0.8 m (2.5 ft), with a maximum of 5.6 pCi/g at a depth of 0.3 m (1 ft). A sample from the borehole located in the South Dump was contaminated to 1 m (3 ft) below the ground surface, with a maximum concentration of 37.5 pCi/g at a depth of 0.3 m (1 ft) (Marutzky et al. 1988).

For comparative purposes, 9 boreholes were drilled off-site to establish background concentrations of radionuclides. The sampling locations (A, B, C, and 1 through 6) are shown in Fig. 7, and the analytical results are summarized in Table 2.

THREAT TO PUBLIC HEALTH AND THE ENVIRONMENT

A potential health and environmental hazard exists at the Weldon Spring site due to high levels of uranium in the outflow from the Ash Pond area. The contamination poses a similar hazard off-site because at least a portion of this outflow, which enters the subsurface just west of the site boundary, surfaces again at Burgermeister Spring in the Busch Wildlife Area. Lake 35 in the wildlife area also receives surface water directly from Ash Pond (MK-Ferguson and Jacobs Engineering 1987). Contamination of Lake 35 and Burgermeister Spring poses a potential health hazard to area personnel, the general public, and resident wildlife.

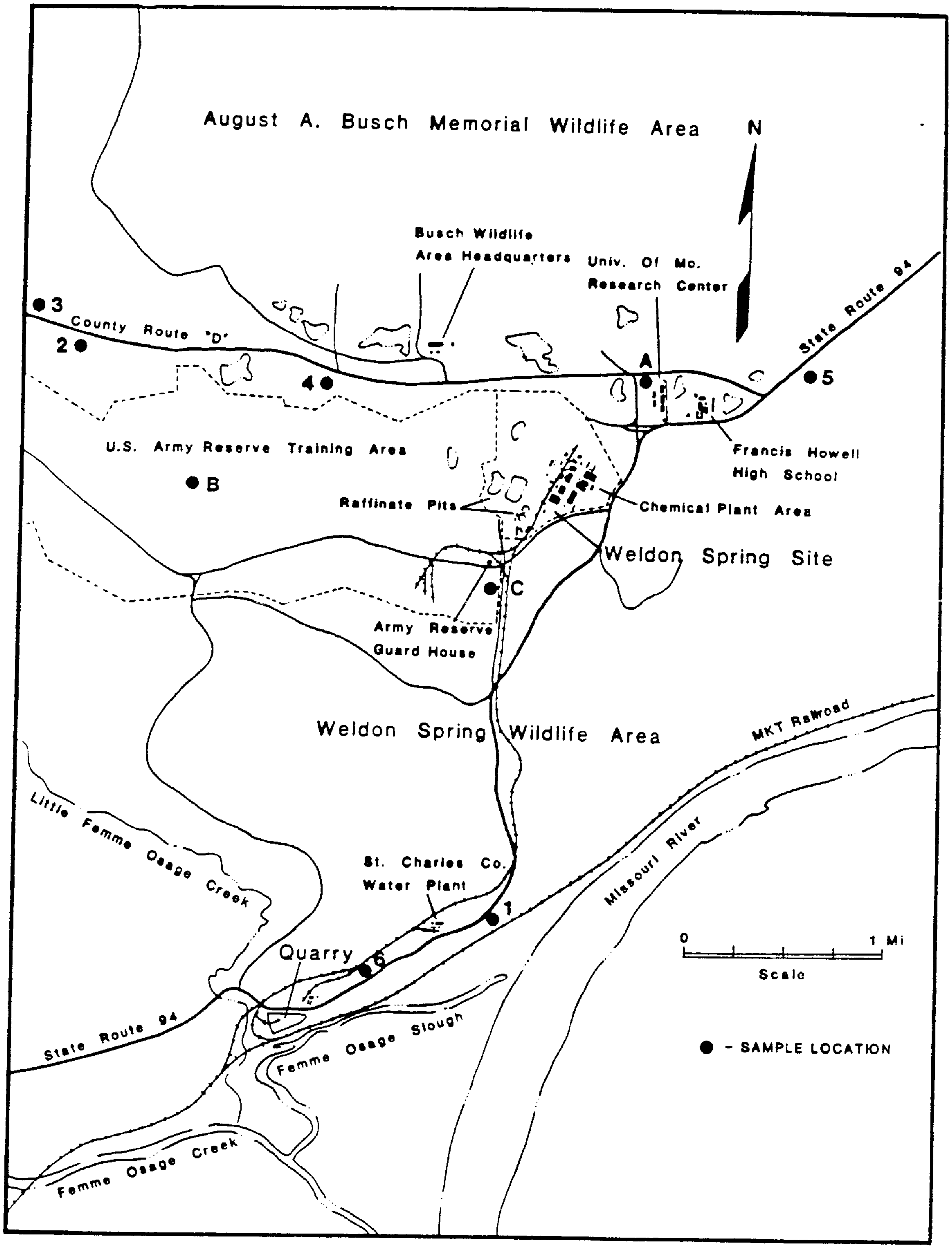

FIGURE 7 Off-site Radiological Sampling Locations (Source: MK-Ferguson and Jacobs Engineering 1987)

TABLE 2 Background Concentrations of Radionuclides in Surface Soil

Off-site Location[a]	Concentration (pCi/g) Radium-226	Thorium-232	Uranium-238
1	0.8	0.9	< DL[b]
2	1.1	0.9	< DL
3	1.3	0.6	< DL
4	0.8	0.8	< DL
5	0.9	1.0	< DL
6	1.1	1.0	< DL
A	0.9	0.7	< DL
B	0.5	1.2	< DL
C	1.2	0.4	< DL

[a]Samples from locations 1-6 were composited over 15 cm (6 in.); samples from locations A-C were composited over 1 m (3 ft).

[b]DL = detection limit (about 1.9 pCi/g).

Source: Data from MK-Ferguson and Jacobs Engineering (1987).

RESPONSE ACTION

Response Action Objectives

The objectives of the proposed response action are as follows:

1. Reduction of the potential on-site health hazard due to uranium contamination of surface water in the Ash Pond area;

2. Reduction of the potential off-site health hazard due to uranium contamination of receiving waters in the Busch Wildlife Area;

3. Reduction of the surface water infiltration rate through contaminated soils in the Ash Pond area; and

4. Improvement in the quality of water being discharged off-site from the Ash Pond area.

These objectives can be met by limiting surface water flow through the contaminated Ash Pond area by means of the proposed isolation system.

Proposed Response Action Alternatives

Interim (expedited) response actions are implemented to ensure the health and safety of on-site personnel and local populations and to minimize or preclude off-site releases of contamination. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act (SARA), and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., actions will be limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

The following alternatives have been identified for the proposed interim response action to reduce contamination of surface runoff from the Ash Pond area:

1. No action;

2. Excavation of contaminated material from the Ash Pond area, including the South Dump, which is responsible for radiological contamination of surface flow through the area, with on-site storage of all material that exceeds the radiological criteria for unrestricted release (and on-site interim storage of any material that exceeds limits for chemical contamination, if discovered, pending a disposal decision);

3. Construction of a dike at the site boundary downstream of the Ash Pond area to provide a retention basin for the contaminated water until it can be decontaminated at an on-site water treatment plant; and

4. Construction of an isolation dike upstream of Ash Pond to prevent contact of surface runoff with contaminated material in the Ash Pond area (e.g., the South Dump) and construction of diversion channels to route the water away from these contaminated locations for subsequent outflow at its current off-site discharge point.

Screening and Analysis of Response Action Alternatives

The four alternatives that have been identified for the proposed action are screened and analyzed below on the basis of criteria identified in U.S. Environmental Protection Agency (EPA) guidance for removal actions. These criteria include technical feasibility, environmental impacts, cost, and institutional factors (e.g., timeliness, compliance with ARARs, and protectiveness of public health and welfare).

If no action were taken (Alternative 1), the potential health threat posed by uranium contamination of surface runoff from Ash Pond would not be reduced, nor would on-site or off-site environmental conditions be improved. Although Alternative 1 presents no technical barriers and costs nothing in the short term, it is effectively precluded by the potential for adverse environmental impacts and significant long-term costs (e.g., for the cleanup of areas not currently contaminated but to which contaminants may migrate if no action is taken). It is also precluded by institutional factors related to the community's desire for timely response actions at the Weldon Spring site -- in particular, for a reduction in the off-site release of contaminants.

The action alternatives (Alternatives 2 through 4) are technically feasible and would reduce the potential hazards associated with uranium contamination of surface runoff. Environmental conditions, both on-site and off-site, would be improved if any of these alternatives were implemented.

Alternative 2 is expected to be more expensive than Alternatives 3 and 4. The affected area would need to be protected from surface water intrusion during the excavation period, which would be reflected in costs for constructing an isolation system. In addition to these construction costs, which would be similar to those for Alternatives 3 and 4, Alternative 2 would incur costs associated with storage -- i.e., for all material exceeding radiological release criteria and for chemically contaminated material, if encountered, pending a disposal decision. Thus, a material staging area would be required for Alternative 2; the plan for such a staging area is currently being addressed as a separate interim response action because of a separately identified need. The more extensive planning and documentation that would be required prior to the implementation of Alternative 2, because of its expanded scope as compared to Alternatives 3 and 4, would increase costs and delay the initiation of any mitigative action. Therefore, Alternative 2 would not satisfy institutional factors related to timeliness, i.e., the community's desire for expedited response with regard to minimizing off-site releases of radioactively contaminated water.

The excavation of contaminated material from the area of the proposed interim response action is not unique to Alternative 2; it is being addressed in remedial action plans for the Weldon Spring site and would occur subsequent to the implementation of either Alternative 3 or 4. The excavation would likely be included in the scope of the record of decision for remedial action at the Weldon Spring site. Thus, the selection of either Alternative 3 or Alternative 4 would preclude the need for interim storage of contaminated material because a decision on waste disposal would have been made by the time of excavation. An additional advantage of selecting Alternative 3 or Alternative 4 instead of Alternative 2 is the flexibility to initiate a timely response action at the Ash Pond area, without being tied to a decision that is within the broader scope of overall remedial action for the Weldon Spring site.

Although implementation of Alternative 3 would prevent surface water from leaving the Ash Pond area (i.e., by virtue of a downstream dike), it would do nothing to mitigate the contamination of this water (i.e., the contact of inflow with contaminated materials would continue). Thus, a water treatment plant would be required to treat the contaminated water prior to its release off-site. Costs associated with the construction and operation of a water treatment plant would make Alternative 3 more expensive than Alternative 4. In addition, institutional factors associated with public pressure to minimize off-site contaminant releases would not be completely addressed by Alternative 3. Ponding of water above areas of contaminated soil would increase the local hydraulic head, thereby increasing the potential for infiltration through these areas and the resultant transport of radionuclides into the groundwater. Finally, Alternative 3 would be unsatisfactory in terms of timeliness and other institutional factors related to construction of the water treatment plant. Because approval for this construction has not yet been addressed by the appropriate federal, state, or local agencies, considerable delays could occur prior to construction of the treatment plant.

In contrast to Alternative 3, Alternative 4 would involve diversion of surface runoff away from contaminated areas in the watershed. Not only would this preclude the contamination of surface runoff resulting from contact with these areas and obviate the need for a water treatment plant, it would also effectively reduce the hydraulic head at Ash Pond, thereby decreasing the potential for contaminant transport into the groundwater. Alternative 4 could be implemented in a timely and cost-effective manner and would be protective of the public and the environment by limiting the off-site release of contaminants.

As a result of the screening and analysis process for interim response action alternatives, Alternative 4 has been identified as the preferred alternative. Alternative 4 is consistent with and will contribute to the efficient performance of remedial action being planned for the Weldon Spring site.

Description of the Proposed Response Action

Implementation of the proposed interim response action to construct an upstream dike and diversion channels would result in restricting the flow of surface water across the contaminated areas of the Ash Pond watershed. The response action would include the following operations:

1. Construction of an isolation dike upstream of Ash Pond -- measuring approximately 230 m (750 ft) in length and 3 m (10 ft) at its maximum height, containing about 5,400 m^3 (7,000 yd^3) of uncontaminated soil material, and creating a retention pond covering a maximum of 0.6 ha (1.5 acres) when full;

2. Construction of diversion channels totaling approximately 610 m (2,500 ft) in length and measuring about 1 m (3 ft) in height, which would circumvent the Ash Pond area and connect the dike to the current point of surface water discharge off-site; and

3. Maintenance of the discharge monitoring station currently in place for intermittent measurement of water quality and continuous measurement of the quantity of surface water discharged from the Ash Pond area.

The proposed action would be conducted in accordance with all applicable or relevant and appropriate requirements (ARARs), to ensure protection of the safety and health of on-site workers and local populations and to limit off-site releases of contaminants. Section 121(d)(4) of SARA identifies six conditions under which a waiver from compliance with ARARs may be granted. One of these conditions is that the action is only part of a total remedial action that will attain such levels or standards of control as identified by the specific ARAR when the total remedial action is completed. If it is determined that a waiver application is necessary, e.g., for uranium discharge limits, this condition is applicable to the proposed interim response action because isolation of the Ash Pond area is by definition an interim measure to minimize the off-site migration of contaminants. It is also important to note that, because the proposed action is an interim measure, the effected reduction in the uranium discharge level is not to be interpreted as an accepted discharge limit for the remedial action project at the Weldon Spring site. Instead, this level is specific to the response action and is dictated by the conditions of that intermediate action, the purpose of which is to improve near-term environmental and safety conditions in the Ash Pond area. The DOE will establish project-specific discharge limits and cleanup criteria for the Weldon Spring site in cooperation with the EPA and the Missouri Department of Natural Resources.

Borrow material for construction of the Ash Pond isolation dike and diversion channels would be obtained from a nearby spoils pile located outside the affected area. Results of characterization studies have indicated that this spoils pile poses no chemical hazard and is not radiologically contaminated.

This interim response action would be taken to reduce the concentration of uranium in water leaving the Ash Pond watershed. It is expected that the uranium concentration would be reduced from as high as 4,000 pCi/L to less than 400 pCi/L, which is below the current DOE uranium-238 limit of 600 pCi/L for release to uncontrolled areas (U.S. Department of Energy 1986). The isolated areas responsible for this contamination (i.e., locations in the Ash Pond area, including the South Dump) would be remediated in the future. Implementation of the proposed response action at this time would minimize the potential adverse impacts on health and the environment resulting from continued runoff of highly contaminated surface water from the watershed and would support the long-term response to contaminated conditions in the Ash Pond area.

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APPENDIX A

DOE GUIDELINES FOR RESIDUAL RADIOACTIVE MATERIAL

U.S. DEPARTMENT OF ENERGY GUIDELINES
FOR RESIDUAL RADIOACTIVE MATERIAL AT
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM
AND
REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

(Revision 2, March 1987)

A. INTRODUCTION

This document presents U.S. Department of Energy (DOE) radiological protection guidelines for cleanup of residual radioactive material and management of the resulting wastes and residues. It is applicable to sites identified by the Formerly Utilized Sites Remedial Action Program (FUSRAP) and remote sites identified by the Surplus Facilities Management Program (SFMP).* The topics covered are basic dose limits, guidelines and authorized limits for allowable levels of residual radioactive material, and requirements for control of the radioactive wastes and residues.

Protocols for identification, characterization, and designation of FUSRAP sites for remedial action; for implementation of the remedial action; and for certification of a FUSRAP site for release for unrestricted use are given in a separate document (U.S. Department of Energy 1986) and subsequent guidance. More detailed information on applications of the guidelines presented herein, including procedures for deriving site-specific guidelines for allowable levels of residual radioactive material from basic dose limits, is contained in "A Manual for Implementing Residual Radioactive Material Guidelines" (U.S. Department of Energy 1987), referred to herein as the "supplement".

"Residual radioactive material" is used in these guidelines to describe radioactive material derived from operations or sites over which DOE has authority. Guidelines or guidance to limit the levels of radioactive material and to protect the public and the environment are provided for (1) residual concentrations of radionuclides in soil,** (2) concentrations of airborne

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*A remote SFMP site is one that is excess to DOE programmatic needs and is located outside a major operating DOE research and development or production area.

**"Soil" is defined herein as unconsolidated earth material, including rubble and debris that may be present in earth material.

radon decay products, (3) external gamma radiation levels, (4) surface contamination levels, and (5) radionuclide concentrations in air or water resulting from or associated with any of the above.

A "basic dose limit" is a prescribed standard from which limits for quantities that can be monitored and controlled are derived; it is specified in terms of the effective dose equivalent as defined by the International Commission on Radiological Protection (ICRP 1977, 1978). The basic dose limits are used for deriving guidelines for residual concentrations of radionuclides in soil. Guidelines for residual concentrations of thorium and radium in soil, concentrations of airborne radon decay products, allowable indoor external gamma radiation levels, and residual surface contamination concentrations are based on existing radiological protection standards (U.S. Environmental Protection Agency 1983; U.S. Nuclear Regulatory Commission 1982; and DOE Departmental Orders). Derived guidelines or limits based on the basic dose limits for those quantities are used only when the guidelines provided in the existing standards cited above are shown to be inappropriate.

A "guideline" for residual radioactive material is a level of radioactivity or radioactive material that is acceptable if use of the site is to be unrestricted. Guidelines for residual radioactive material presented herein are of two kinds: (1) generic, site-independent guidelines taken from existing radiation protection standards and (2) site-specific guidelines derived from basic dose limits using site-specific models and data. Generic guideline values are presented in this document. Procedures and data for deriving site-specific guideline values are given in the supplement. The basis for the guidelines is generally a presumed worst-case plausible-use scenario for the site.

An "authorized limit" is a level of residual radioactive material or radioactivity that must not be exceeded if the remedial action is to be considered completed and the site is to be released for unrestricted use. The authorized limits for a site will include (1) limits for each radionuclide or group of radionuclides, as appropriate, associated with residual radioactive material in soil or in surface contamination of structures and equipment, (2) limits for each radionuclide or group of radionuclides, as appropriate, in air or water, and, (3) where appropriate, a limit on external gamma radiation resulting from the residual material. Under normal circumstances, expected to occur at most sites, authorized limits for residual radioactive material or radioactivity are set equal to guideline values. Exceptional conditions for which authorized limits might differ from guideline values are specified in Sections D and F of this document. A site may be released for unrestricted use only if site conditions do not exceed the authorized limits or approved supplemental limits, as defined in Section F.1, at the time remedial action is completed. Restrictions and controls on use of the site must be established and enforced if site conditions exceed the approved limits, or if there is potential to exceed the basic dose limit if use of the site is not restricted (Section F.2). The applicable controls and restrictions are specified in Section E.

DOE policy requires that all exposures to radiation be limited to levels that are as low as reasonably achievable (ALARA). For sites to be released for unrestricted use, the intent is to reduce residual radioactive material to levels that are as far below authorized limits as reasonable considering technical, economic, and social factors. At sites where the residual material is not reduced to levels that permit release for unrestricted use, ALARA policy is implemented by establishing controls to reduce exposure to levels that are as low as reasonably achievable. Procedures for implementing ALARA policy are discussed in the supplement. ALARA policies, procedures, and actions shall be documented and filed as a permanent record upon completion of remedial action at a site.

B. BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 100 mrem/yr. The internal committed effective dose equivalent, as defined in ICRP Publication 26 (ICRP 1977) and calculated by dosimetry models described in ICRP Publication 30 (ICRP 1978), plus the dose from penetrating radiation sources external to the body, shall be used for determining the dose. This dose shall be described as the "effective dose equivalent". Every effort shall be made to ensure that actual doses to the public are as far below the basic dose limit as is reasonably achievable.

Under unusual circumstances, it will be permissible to allow potential doses to exceed 100 mrem/yr where such exposures are based upon scenarios that do not persist for long periods and where the annual lifetime exposure to an individual from the subject residual radioactive material would be expected to be less than 100 mrem/yr. Examples of such situations include conditions that might exist at a site scheduled for remediation in the near future or a possible, but improbable, one-time scenario that might occur following remedial action. These levels should represent doses that are as low as reasonably achievable for the site. Further, no annual exposure should exceed 500 mrem.

C. GUIDELINES FOR RESIDUAL RADIOACTIVE MATERIAL

C.1 Residual Radionuclides in Soil

Residual concentrations of radionuclides in soil shall be specified as above-background concentrations averaged over an area of 100 m^2. Generic guidelines for thorium and radium are specified below. Guidelines for residual concentrations of other radionuclides shall be derived from the basic dose limits by means of an environmental pathway analysis using site-specific data where available. Procedures for these derivations are given in the supplement.

If the average concentration in any surface or below-surface area less than or equal to 25 m^2 exceeds the authorized limit or guideline by a factor of $(100/A)^{1/2}$, where A is the area of the elevated region in square meters, limits for "hot spots" shall also be applicable. Procedures for calculating these hot spot limits, which depend on the extent of the elevated local concentrations, are given in the supplement. In addition, every reasonable effort shall be made to remove any source of radionuclide that exceeds 30 times the appropriate limit for soil, irrespective of the average concentration in the soil.

Two types of guidelines are provided, generic and derived. The generic guidelines for residual concentrations of Ra-226, Ra-228, Th-230, and Th-232 are:

- 5 pCi/g, averaged over the first 15 cm of soil below the surface

- 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface

These guidelines take into account ingrowth of Ra-226 from Th-230 and of Ra-228 from Th-232, and assume secular equilibrium. If either Th-230 and Ra-226 or Th-232 and Ra-228 are both present, not in secular equilibrium, the appropriate guideline is applied as a limit to the radionuclide with the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that (1) the dose for the mixtures will not exceed the basic dose limit or (2) the sum of the ratios of the soil concentration of each radionuclide to the allowable limit for that radionuclide will not exceed 1 ("unity"). Explicit formulas for calculating residual concentration guidelines for mixtures are given in the supplement.

C.2 Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that are intended for unrestricted use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR Part 192) is: In any occupied or habitable building, the objective of remedial action shall be, and a reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL.* In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions by DOE are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive material is not the cause.

*A working level (WL) is any combination of short-lived radon decay products in one liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy.

C.3 External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site to be released for unrestricted use shall not exceed the background level by more than 20 μR/h and shall comply with the basic dose limit when an appropriate-use scenario is considered. This requirement shall not necessarily apply to structures scheduled for demolition or to buried foundations. External gamma radiation levels on open lands shall also comply with the basic dose limit, considering an appropriate-use scenario for the area.

C.4 Surface Contamination

The generic surface contamination guidelines provided in Table 1 are applicable to existing structures and equipment. These guidelines are adapted from standards of the U.S. Nuclear Regulatory Commission (NRC 1982)* and will be applied in a manner that provides a level of protection consistent with the Commission's guidance. These limits apply to both interior and exterior surfaces. They are not directly intended for use on structures to be demolished or buried, but should be applied to equipment or building components that are potentially salvageable or recoverable scrap. If a building is demolished, the guidelines in Section C.1 are applicable to the resulting contamination in the ground.

C.5 Residual Radionuclides in Air and Water

Residual concentrations of radionuclides in air and water shall be controlled to levels required by DOE Environmental Protection Guidance and Orders, specifically DOE Order 5480.1A and subsequent guidance. Other Federal and/or state standards shall apply when they are determined to be appropriate.

D. AUTHORIZED LIMITS FOR RESIDUAL RADIOACTIVE MATERIAL

Authorized limits shall be established to (1) ensure that, as a minimum, the basic dose limits specified in Section B will not be exceeded under the worst-case plausible-use scenario consistent with the procedures and guidance provided or (2) be consistent with applicable generic guidelines, where such guidelines are provided. The authorized limits for each site and its vicinity properties shall be set equal to the generic or derived guidelines except where it can be clearly established on the basis of site-specific data -- including health, safety, and socioeconomic considerations -- that the guidelines are not appropriate for use at the specific site. Consideration should also be given to ensure that the limits comply with or provide a level of protection equivalent to other appropriate limits and guidelines (i.e., state or

*These guidelines are functionally equivalent to Section 4 -- Decontamination for Release for Unrestricted Use -- of NRC Regulatory Guide 1.86 (U.S. Atomic Energy Commission 1974), but they are applicable to non-reactor facilities.

TABLE 1 SURFACE CONTAMINATION GUIDELINES

Radionuclides[b]	Allowable Total Residual Surface Contamination (dpm/100 cm^2)[a]		
	Average[c,d]	Maximum[d,e]	Removable[d,f]
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 β-γ	15,000 β-γ	1,000 β-γ

[a] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[b] Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

[c] Measurements of average contamination should not be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.

[d] The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

[e] The maximum contamination level applies to an area of not more than 100 cm^2.

[f] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

other Federal). Documentation supporting such a decision should be similar to that required for supplemental limits and exceptions (Section F), but should be generally more detailed because the documentation covers the entire site.

Remedial action shall not be considered complete unless the residual radioactive material levels comply with the authorized limits. The only exception to this requirement will be for those special situations where the supplemental limits or exceptions are applicable and approved as specified in Section F. However, the use of supplemental limits and exceptions should be considered only if it is clearly demonstrated that it is not reasonable to decontaminate the area to the authorized limit or guideline value. The authorized limits are developed through the project offices in the field and are approved by the headquarters program office.

E. CONTROL OF RESIDUAL RADIOACTIVE MATERIAL AT FUSRAP AND REMOTE SFMP SITES

Residual radioactive material above the guidelines at FUSRAP and remote SFMP sites must be managed in accordance with applicable DOE Orders. The DOE Order 5480.1A and subsequent guidance or superceding Orders require compliance with applicable Federal and state environmental protection standards.

The operational and control requirements specified in the following DOE Orders shall apply to interim storage, interim management, and long-term management.

a. 5000.3, Unusual Occurrence Reporting System

b. 5440.1C, Implementation of the National Environmental Policy Act

c. 5480.1A, Environmental Protection, Safety, and Health Protection Program for DOE Operations, as revised by DOE 5480.1 change orders and the 5 August 1985 memorandum from Vaughan to Distribution

d. 5480.2, Hazardous and Radioactive Mixed Waste Management

e. 5480.4, Environmental Protection, Safety, and Health Protection Standards

f. 5482.1A, Environmental, Safety, and Health Appraisal Program

g. 5483.1A, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities

h. 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements

i. 5820.2, Radioactive Waste Management

E.1 Interim Storage

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years.

b. Above-background Rn-222 concentrations in the atmosphere above facility surfaces or openings shall not exceed (1) 100 pCi/L at any given point, (2) an annual average concentration of 30 pCi/L over the facility site, and (3) an annual average concentration of 3 pCi/L at or above any location outside the facility site (DOE Order 5480.1A, Attachment XI-1).

c. Concentrations of radionuclides in the groundwater or quantities of residual radioactive material shall not exceed existing Federal or state standards.

d. Access to a site shall be controlled and misuse of on-site material contaminated by residual radioactive material shall be prevented through appropriate administrative controls and physical barriers -- active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These control features should be designed to ensure, to the extent reasonable, an effective life of at least 25 years. The Federal government shall have title to the property or shall have a long-term lease for exclusive use.

E.2 Interim Management

a. A site may be released under interim management when the residual radioactive material exceeds guideline values if the residual radioactive material is in inaccessible locations and would be unreasonably costly to remove, provided that administrative controls are established to ensure that no member of the public shall receive a radiation dose exceeding the basic dose limit.

b. The administrative controls, as approved by DOE, shall include but not be limited to periodic monitoring as appropriate, appropriate shielding, physical barriers to prevent access, and appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactive material or cause it to migrate.

c. The owner of the site or appropriate Federal, state, or local authorities shall be responsible for enforcing the administrative controls.

E.3 Long-Term Management

Uranium, Thorium, and Their Decay Products

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years.

b. Control and stabilization features shall be designed to ensure that Rn-222 emanation to the atmosphere from the wastes shall not (1) exceed an annual average release rate of 20 $pCi/m^2/s$ and (2) increase the annual average Rn-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L. Field verification of emanation rates is not required.

c. Prior to placement of any potentially biodegradable contaminated wastes in a long-term management facility, such wastes shall be properly conditioned to ensure that (1) the generation and escape of biogenic gases will not cause the requirement in paragraph b. of this section (E.3) to be exceeded and (2) biodegradation within the facility will not result in premature structural failure in violation of the requirements in paragraph a. of this section (E.3).

d. Groundwater shall be protected in accordance with appropriate Departmental Orders and Federal and state standards, as applicable to FUSRAP and remote SFMP sites.

e. Access to a site should be controlled and misuse of on-site material contaminated by residual radioactivity should be prevented through appropriate administrative controls and physical barriers -- active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These controls should be designed to be effective to the extent reasonable for at least 200 years. The Federal government shall have title to the property.

Other Radionuclides

f. Long-term management of other radionuclides shall be in accordance with Chapters 2, 3, and 5 of DOE Order 5820.2, as applicable.

F. SUPPLEMENTAL LIMITS AND EXCEPTIONS

If special site-specific circumstances indicate that the guidelines or authorized limits established for a given site are not appropriate for a portion of that site or for a vicinity property, then the field office may request that supplemental limits or an exception be applied. In either case, the field office must justify that the subject guidelines or authorized limits are not appropriate and that the alternative action will provide adequate protection, giving due consideration to health and safety, the environment, and costs. The field office shall obtain approval for specific supplemental limits or exceptions from headquarters as specified in Section D of these guidelines and shall provide to headquarters those materials required for the justification as specified in this section (F) and in the FUSRAP and SFMP protocols and subsequent guidance documents. The field office shall also be responsible for coordination with the state or local government of the limits or exceptions and associated restrictions as appropriate. In the case of exceptions, the field office shall also work with the state and/or local governments to ensure that restrictions or conditions of release are adequate and mechanisms are in place for their enforcement.

F.1 Supplemental Limits

The supplemental limits must achieve the basic dose limits set forth in this guideline document for both current and potential unrestricted uses of a site and/or vicinity property. Supplemental limits may be applied to a vicinity property or a portion of a site if, on the basis of a site-specific analysis, it is determined that (1) certain aspects of the vicinity property or portion of the site were not considered in the development of the established authorized limits and associated guidelines for that vicinity property or site and, (2) as a result of these unique characteristics, the established limits or guidelines either do not provide adequate protection or are unnecessarily restrictive and costly.

F.2 Exceptions

Exceptions to the authorized limits defined for unrestricted use of a site or vicinity property may be applied to a vicinity property or a portion of a site when it is established that the authorized limits cannot be achieved and restrictions on use of the vicinity property or portion of the site are necessary to provide adequate protection of the public and the environment. The field office must clearly demonstrate that the exception is necessary and that the restrictions will provide the necessary degree of protection and will comply with the requirements for control of residual radioactive material as set forth in Section E of these guidelines.

F.3 Justification for Supplemental Limits and Exceptions

Supplemental limits and exceptions must be justified by the field office on a case-by-case basis using site-specific data. Every effort should be made to minimize use of the supplemental limits and exceptions. Examples of specific situations that warrant use of the supplemental standards and exceptions are:

a. Where remedial action would pose a clear and present risk of injury to workers or members of the general public, notwithstanding reasonable measures to avoid or reduce risk.

b. Where remedial action -- even after all reasonable mitigative measures have been taken -- would produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near affected sites, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

c. Where it is clear that the scenarios or assumptions used to establish the authorized limits do not, under plausible current or future conditions, apply to the property or portion of the site identified and where more appropriate scenarios or assumptions indicate that other limits are applicable or necessary for protection of the public and the environment.

d. Where the cost of remedial action for contaminated soil is unreasonably high relative to long-term benefits and where the residual radioactive material does not pose a clear present or future risk after taking necessary control measures. The likelihood that buildings will be erected or that people will spend long periods of time at such a site should be considered in evaluating this risk. Remedial action will generally not be necessary where only minor quantities of residual radioactive material are involved or where residual radioactive material occurs in an inaccessible location at which site-specific factors limit their hazard and from which they are costly or difficult to remove. Examples include residual radioactive material under hard-surface public roads and sidewalks, around public sewer lines, or in fence-post foundations. A site-specific analysis must be provided to establish that it would not cause an individual to receive a radiation dose in excess of the basic dose limits stated in Section B, and a statement specifying the level of residual radioactive material must be included in the appropriate state and local records.

e. Where there is no feasible remedial action.

G. SOURCES

Limit or Guideline	Source
Basic Dose Limits	
Dosimetry model and dose limits	International Commission on Radiological Protection (1977, 1978)
Generic Guidelines for Residual Radioactivity	
Residual concentrations of radium and thorium in soil	40 CFR Part 192
Airborne radon decay products	40 CFR Part 192
External gamma radiation	40 CFR Part 192
Surface contamination	Adapted from U.S. Nuclear Regulatory Commission (1982)
Control of Radioactive Wastes and Residues	
Interim storage	DOE Order 5480.1A and subsequent guidance
Long-term management	DOE Order 5480.1A and subsequent guidance; 40 CFR Part 192; DOE Order 5820.2

H. REFERENCES

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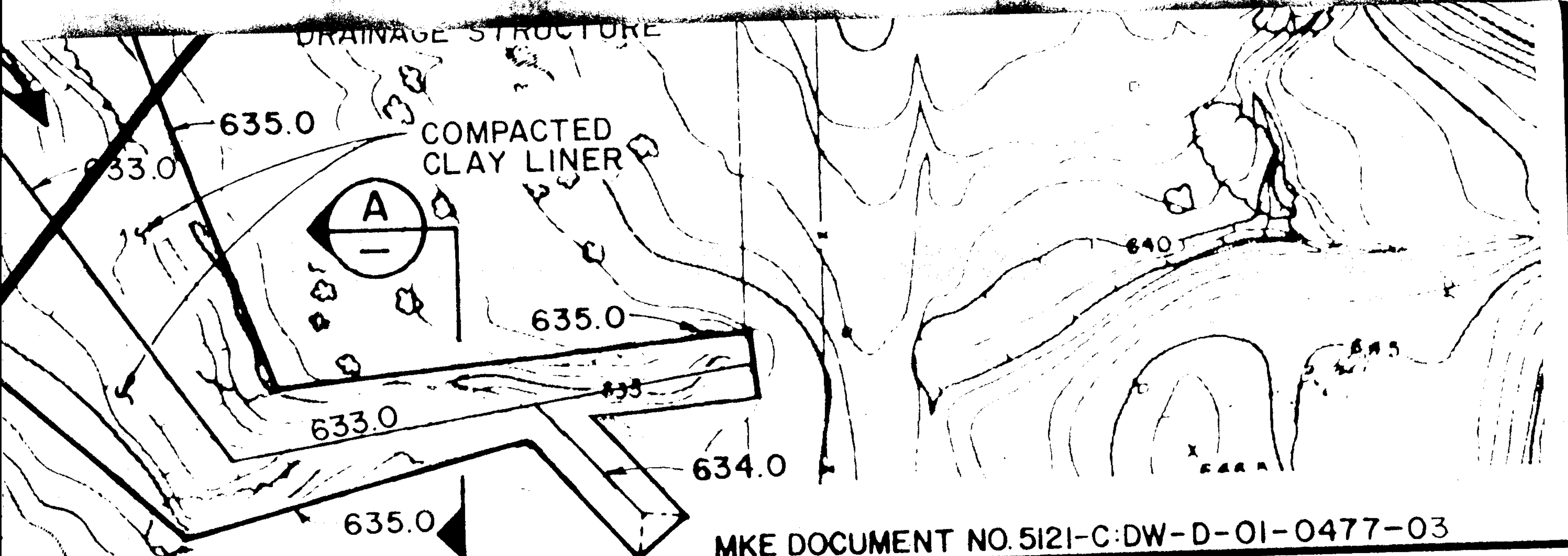

MKE DOCUMENT NO. 5121-C:DW-D-01-0477-03

U. S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

CHEMICAL PLANT
CONSTRUCTION DRAWINGS

ASH POND ISOLATION DIKE PLAN

DESIGNED	DRAWN WSO/JMM
CHECKED	
INSPECTED	
RECOMMENDED	
APPROVED J L Jordan	DATE 24 Jun 87
CHIEF ENG E.S. Smith / QA MGR	DATE 25 Jun 87
PMC ENG'G. MGR. DK Lewis	DATE 8/14/87
DOE PROJ. ENG.	DATE

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON-KNUDSEN COMPANY
WSSRA PROJECT
180 HOWARD ST. SAN FRANCISCO, CA 94105

PROJECT NO. DE-AC05-86OR21548

DRAWING NO. 5121E-CP-588-04

REV. 4

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QA IKE	ENG'G MGR.	QA MK-F	DOE APP.

9. CONCRETE SHALL HAVE MINIMUM 28 DAY COMPRESSIVE

SECTION 5/589
NOT TO SCALE

ATERIAL
TYPE A
AL(TYP)

MKE DOCUMENT NO. 5121-C:DW-D-01-0478-03

U. S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

CHEMICAL PLANT
CONSTRUCTION DRAWINGS
ASH POND ISOLATION DIKE
SECTIONS AND DETAILS
(SHEET 1 OF 2)

DESIGNED	DRAWN WSO/AMC
CHECKED	
INSPECTED E. C. TAL	
RECOMMENDED E. C. TAL	

APPROVED	DATE	CHIEF ENG/QA MGR	DATE	PMC ENG'G MGR.	DATE	DOE PROJ ENG	DATE
[signature]	24 Jun 87	S. S. Smith / P. D. Donatone	25 Jun 87	[signature]	8/14/87	[signature]	1/12/88

MORRISON-KNUDSEN ENGINEERS, INC.
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DRAWING NO. 5121E-CP-589-04 REV. 4

QA MKE	ENG'G MGR.	QA MK-F	DOE APP.
	TEH	JH	
	N-H	HH	
	TEH	HH	
dc	SK	JH	
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CP-ISOLATION AND DRAINAGE DIKES

IRA-200-202

DOE/OR/21548-051
(CONTRACT NO. DE-AC05-86OR21548)

CHEMICAL SOIL DATA REPORT TO SUPPORT INTERIM RESPONSE ACTIONS, CONSTRUCTION STAGING AREA, AND ADMINISTRATION BUILDING

For The :
Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

Prepared By MK-Ferguson Company
FEBRUARY, 1989 REV. 0

U.S. Department Of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

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WELDDATA/TXTJOANN

WELDON SPRING SITE REMEDIAL ACTION PROJECT

CHEMICAL SOIL DATA REPORT TO SUPPORT INTERIM RESPONSE ACTIONS, CONSTRUCTION STAGING AREA AND ADMINISTRATION BUILDING

FEBRUARY 1989

Prepared for:
U.S. DEPARTMENT OF ENERGY
Oak Ridge Operations Office
Under Contract No. DE-AC05-86OR21548

by

MK-FERGUSON COMPANY
Project Management Contractor
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WELDDATA/TXTJOANN

ABSTRACT

Five activities are planned to improve environmental conditions or to improve facilities at the Weldon Spring Site. Each activity must be evaluated for potential environmental impacts. Chemical soil contamination was potentially present in each affected area. A sampling program was designed and implemented to evaluate chemical soil conditions. Samples were analyzed for nitroaromatic compounds, metals, inorganic anions, semi-volatile and volatile organic compounds, pesticides, and PCBs.

This investigation documented low concentrations of semi-volatile organic compounds, pesticides, PCBs and nitroaromatics. Higher concentrations of nitrate, sulfate and some metals were also detected.

The contaminants detected are consistent with past operations at the WSS. The concentrations of contaminants do not significantly impact the proposed activities. Data from this investigation has been incorporated into the planning and documentation activities for each activity.

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1 INTRODUCTION

This report addresses three areas proposed for interim remedial action (IRA) and two areas where construction is planned prior to completion of chemical soil characterization. The three IRA areas are the Ash Pond Isolation Dike (AID), the Southeast Drainage Isolation Dike (SID), and the Material Staging Area (MSA). The two construction areas are the locations of the Administration Building (AB) and the construction staging area (CSA). These areas are shown in Figure 1.

The soils in these five areas were sampled in support of the design of the IRAs, to validate previous sampling results, and to evaluate the environmental impact of the IRAs. This report summarizes the analytical data from these samples.

This soil characterization effort was required before the overall chemical soil characterization could be performed. The overall chemical soil characterization program is described fully in the chemical soil characterization sampling plan (MK-F, 1988a). The overall soil sampling rationale is presented in that sampling plan and should be reviewed before attempting to further interpret the analytical data presented in this report.

The three IRA areas were identified during previous investigations as areas which could benefit from small actions not biasing an overall Record of Decision (ROD) on the disposition of the majority of the wastes on site. These IRAs support the overall Weldon Spring Site Remedial Action Program (WSSRAP) and will maintain exposure as low as reasonably achievable. These actions consist of diverting and isolating surface drainage in two areas and constructing a contaminated materials storage area.

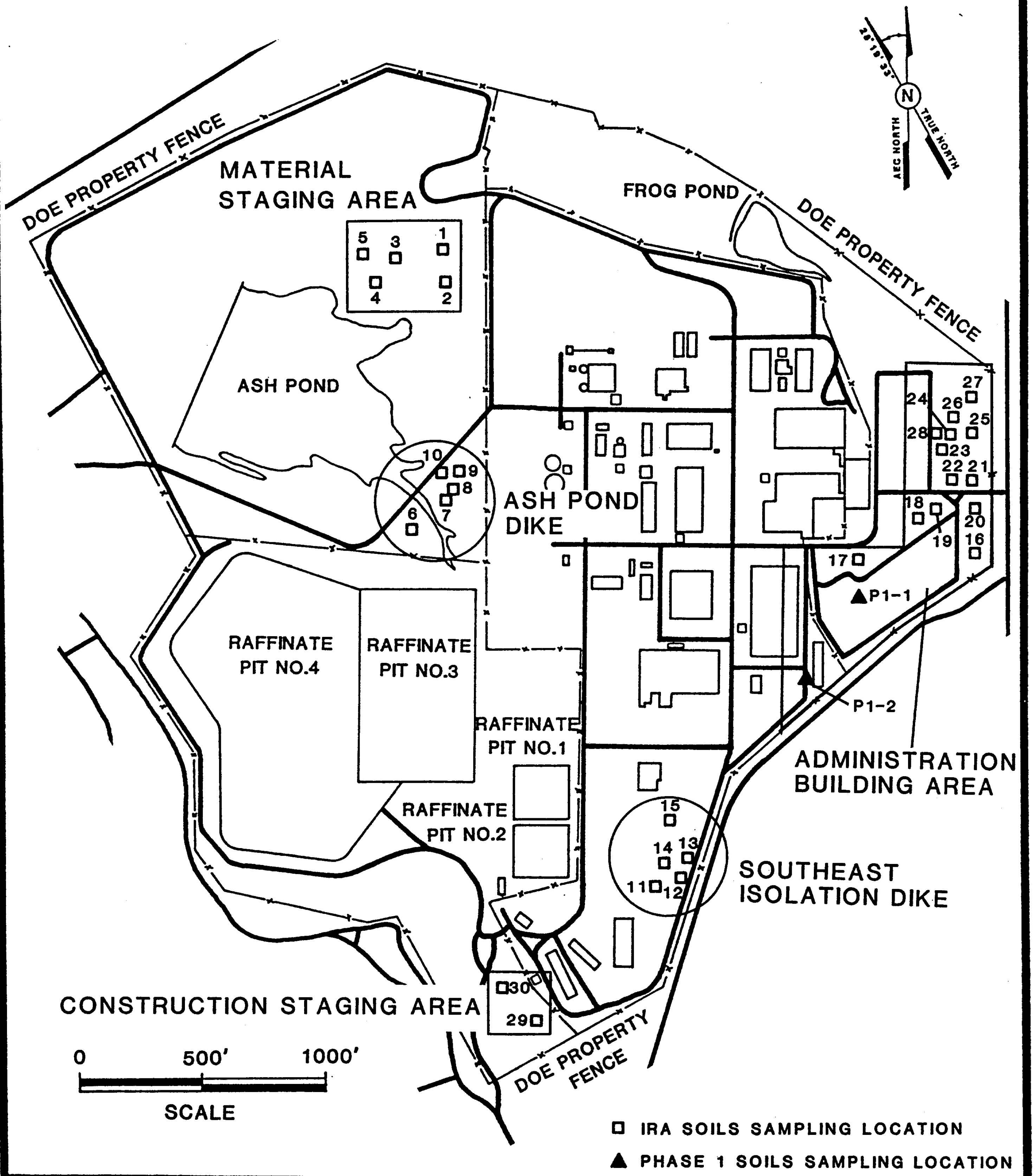

FIGURE 1

WELDON SPRING IRA SOIL SAMPLING LOCATIONS

1.1 PURPOSE

The purpose of the soil sampling in each of the areas was to provide data for the design of the IRA and construction activities. Sampling analyses provided information on chemical soil contamination in the areas affected by the isolation and drainage dikes and on the storage area for holding contaminated materials. The results also delineate conditions in the vicinity of the proposed Administration Building and the Construction Staging Area.

1.2 SCOPE

This program was designed to detect chemical soil contamination from the Weldon Spring Ordnance Works (WSOW) and the Weldon Spring Uranium Feed Materials Plant (WSUFMP) in the five areas. The WSOW produced explosives for use in World War II from 1941 to 1945. The WSUFMP processed uranium ore and produced uranium metal from 1956 to 1966. These two facilities comprise the known potential sources for chemical soil contamination.

Radiological contamination in each area is not discussed in this report. Radiological characterization data is presented in Radiological Characterization Reports for each IRA.

This sampling effort consisted of collecting 150 samples from 30 sample locations. Five borings were located in the Material Staging Area, five in the Ash Pond Isolation Dike area, and five in the Southeast Isolation Dike area. Thirteen borings were located around several proposed Administration Building sites, and two borings were located in the Construction Staging Area. Table 1 lists all boring locations, west-north coordinates and boring depths. The location numbers (1-30) correspond to the locations shown in Figure 1. Boring depths were determined by evaluating the depths that will be affected

TABLE 1

BORING LOCATIONS

LOCATION NO.	IRA AREA	COORDINATES WEST, NORTH	BORING DEPTH (FEET)
1	Material Staging Area	51150, 101207	10
2	Material Staging Area	51137, 101068	12
3	Material Staging Area	51360, 101175	10
4	Material Staging Area	51445, 101065	12
5	Material Staging Area	51500, 101190	12
6	Ash Pond Dike	51308, 100085	10
7	Ash Pond Dike	51150, 100220	10
8	Ash Pond Dike	51125, 100260	10
9	Ash Pond Dike	51100, 100335	10
10	Ash Pond Dike	51180, 100335	7
11	Southeast Isolation Dike	50290, 98700	8
12	Southeast Isolation Dike	50160, 98735	12
13	Southeast Isolation Dike	50140, 98820	8
14	Southeast Isolation Dike	50252, 98800	8
15	Southeast Isolation Dike	50230, 98991	8
16	Administration Building	49000, 99985	8
17	Administration Building	49475, 99985	12
18	Administration Building	49250, 100140	10
19	Administration Building	49172, 100180	8
20	Administration Building	49000, 100180	8
21	Administration Building	49000, 100295	8
22	Administration Building	49080, 100295	10
23	Administration Building	49132, 100440	16
24	Administration Building	49101, 100500	16
25	Administration Building	49000, 100500	12
26	Administration Building	49082, 100570	16
27	Administration Building	49000, 100665	12
28	Administration Building	49160, 100500	12
29	Construction Staging Area	50800, 98150	15
30	Construction Staging Area	50950, 98300	15
P1-1	Phase I - Admin. Building	49500, 99800	6
P1-2	Phase I - Admin. Building	49700, 99500	6

P1 - Phase I Chemical Soil Investigation Location.

by the specific construction activity and the depth of fill in each specific area.

Analytical parameters were selected on the basis of the results of Phase I chemical soil investigation (MK-F, 1988b) and Phase I water quality assessment (MK-F, 1987) which detected elevated concentrations of inorganic anions, metals, and nitroaromatics in several areas of the Weldon Spring Site (WSS). Certain locations were analyzed for Hazardous Substance List (HSL) volatiles, semi-volatiles, pesticides, and PCBs to provide additional information of the affected areas.

A brief description and the previous characterization data for each area is presented in the following subsections. The sampling and analysis methods are described in Section 2. Analytical data and interpretations are presented in Section 3.

1.3 MATERIAL STAGING AREA

The Material Staging Area (MSA) consists of approximately three acres located about 1,100 feet north of Raffinate Pit 3. This area subtends 500 feet by 250 feet and will be used to store contaminated materials from other IRAs, such as Debris Consolidation and Army Vicinity Property cleanup.

Previous investigations (MK-F, 1988b) in the MSA included adequate radiological soils characterization, but used only one borehole for chemical analyses. No chemical contamination was detected in this single borehole. Therefore, additional data were required to more fully characterize any chemical contamination which could be present in this area.

The additional chemical characterization for the MSA consisted of five boreholes drilled to depths of 10 ft to 12 ft with continuous sample collection. These depths exceed the depth of soil disturbance expected from this IRA. Samples were composited over two-foot intervals in each borehole. All samples were analyzed for metals, inorganic anions (nitrate, sulfate, chloride, and fluoride), and nitroaromatic compounds. Certain locations were analyzed for pesticides, PCBs and semi-volatiles. After sampling, the boreholes were sealed by grouting with a cement-bentonite grout.

1.4 ASH POND ISOLATION DIKE

The Ash Pond Isolation Dike (AID) is proposed to divert surface runoff around the contaminated areas of the South Dump and Ash Pond by means of an earth embankment and drainage channel.

Previously collected information within the affected area consisted of adequate radiological soils characterization data, but only one borehole and three samples were analyzed for chemical parameters (MK-F, 1988b). These analyses indicated slightly elevated nitrate and sulfate levels in the soils. Chemical characterization data was required to evaluate the effects of ponding water on soils in the area affected by this IRA. These data will be used to further define the environmental impacts of the proposed IRA.

Additional characterization activities to support the AID IRA included drilling five boreholes ten feet deep with continuous sample collection. Samples were composited over two-foot intervals in each borehole and analyzed for metals, inorganic anions, and nitroaromatics. Also, certain locations were analyzed for pesticides, PCBs, and semi-volatiles. The boreholes were sealed by grouting with a cement-bentonite grout. The boreholes were located in potential borrow areas and at the former locations of Weldon Spring Ordnance Works (WSOW) buildings and wastewater lines.

1.5 SOUTHEAST ISOLATION DIKE

The third IRA requiring additional characterization is the Southeast Drainage Isolation Dike (SID). The scope of this IRA is similar to the AID IRA. No known structures or process lines from the WSOW were in this area.

Characterization requirements and activities for this IRA were also very similar, with five boreholes drilled. Samples were collected continuously and were analyzed for the same chemical parameters as other IRA locations.

1.6 ADMINISTRATION BUILDING AREA

Four proposed sites for the Administration Building (ABA) were investigated to ensure the selection of an uncontaminated area for this building (Figure 2).

The chemical characterization activity for this area consisted of drilling 13 boreholes with continuous sample collection. The boreholes varied in depth from 10 ft to 16 feet, which exceeds the excavation depth for building construction. At each borehole location, the samples collected were composited over two-foot intervals. These samples were analyzed for the same parameters as the other IRAs.

One of the boreholes was located at the site of a WSOW Toluene Storage Area. Samples from this borehole were analyzed for volatile and semi-volatile compounds in addition to the other parameters.

1.7 CONSTRUCTION STAGING AREA

The Construction Staging Area (CSA) covers approximately one acre at the southwest corner of the WSCP/WSRP. This area was a candidate site for construction support facilities including

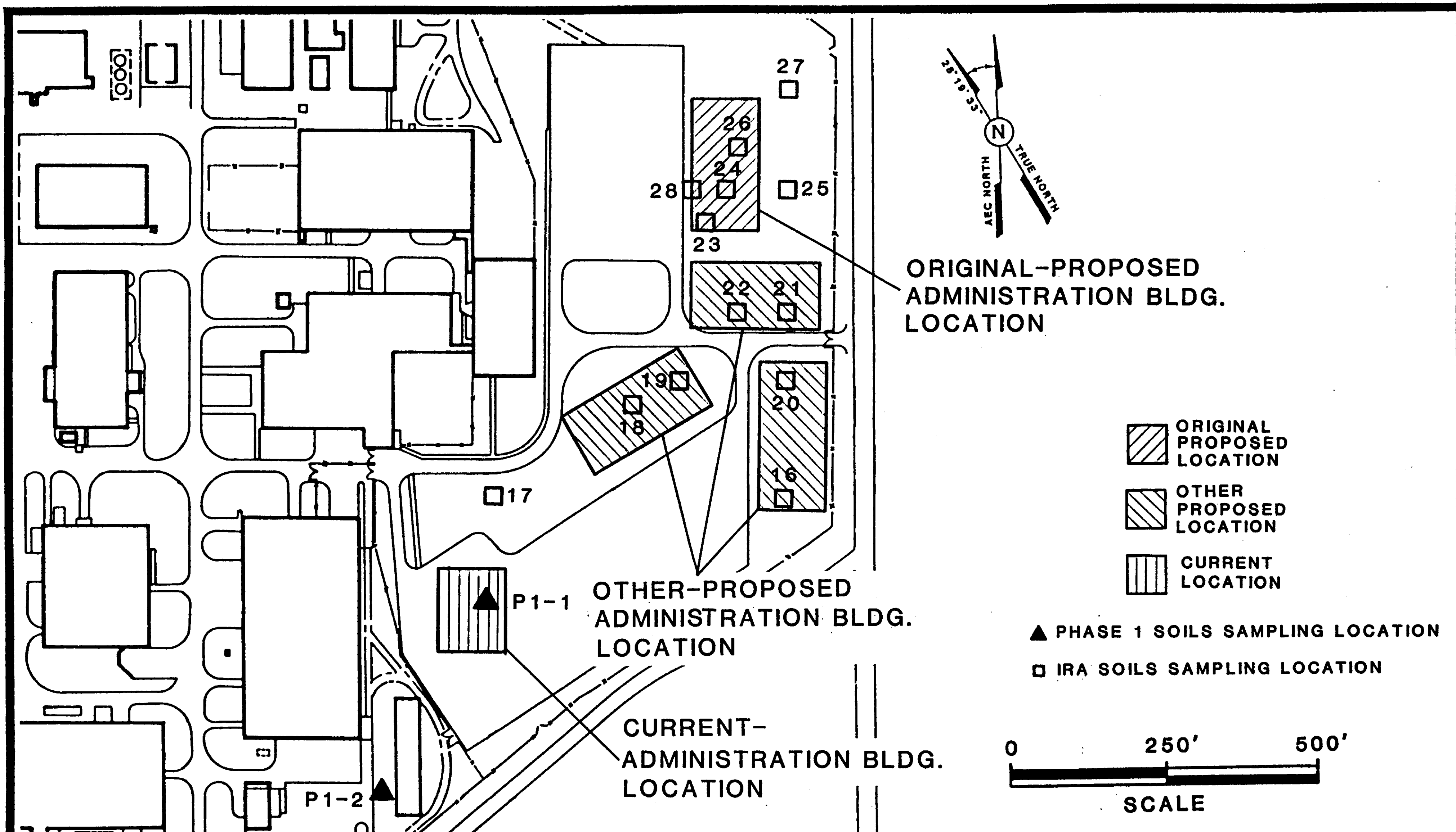

FIGURE 2

ADMINISTRATION BUILDING LOCATION

decontamination facilities for vehicles and personnel, a subcontractor trailer area, a guard shelter, and a control point for access to the controlled area.

The chemical characterization activities for this area consisted of drilling two boreholes to a depth of 15 feet. Two composite samples from each location were collected. The samples from the 0-ft to 7-ft interval were analyzed for metals, inorganic anions (nitrate, sulfate, chloride, and fluoride), nitroaromatic compounds, semi-volatiles, volatiles, PCB's and pesticides. The 8-ft to 15-ft interval samples were analyzed for inorganic anions only.

2 SAMPLING AND ANALYSES

2.1 SAMPLE COLLECTION

A total of 150 samples were collected from 30 sample locations using a truck-mounted Central Mine Equipment 55 (CME) drill rig employing a 6 5/8 inch O.D. hollow stem auger for drilling and the CME continuous sampler system. All samples, except those located in the Construction Staging Area, were composited over two-foot intervals to optimize analytical costs and achieve representative samples.

2.2 EQUIPMENT DECONTAMINATION

Soil sampling equipment was cleaned using a decontamination procedure designed to protect against cross contamination by nitroaromatic compounds and other chemical species. All augers, drill rods, and continuous samplers were washed using a high-pressure hot water washer. Augers and drill rods were cleaned between boreholes while continuous samplers were decontaminated between samples.

After washing, the continuous samplers were allowed to air dry. Then they were rinsed with toluene, followed by rinsing with acetone and hexane. The toluene rinse was used to dissolve any nitroaromatic residues. Acetone and hexane rinses were employed to remove toluene and other contaminants not removed by the hot water wash. The continuous samplers were allowed to air dry again prior to being reassembled. All rinsing solvents were collected. Stainless steel spatulas and pans were washed with distilled water, then rinsed with the same solvent sequence as used on the continuous samplers. This procedure was performed between every sample.

Field personnel wore new disposable vinyl gloves when collecting soil samples. Gloves were changed after decontaminating sampling equipment.

2.3 SAMPLE HANDLING AND PRESERVATION

The filled continuous samplers were opened in a shaded area to prevent photolysis of nitroaromatic compounds. Samples were collected from the continuous core using decontaminated stainless steel spatulas and pans. No chemical preservation was required during sample collection. The collected samples were placed in a cooler with blue ice. All samples were chilled immediately following sample collection and kept chilled throughout sample collection and shipment. All field samples were sent to the analytical laboratory in accordance with WSSRAP chain-of-custody standard operating procedures.

2.4 SAMPLE ANALYSES

Sample analyses were performed according to applicable EPA CLP protocols for metals, organics, pesticides, and PCBs. EPA method 300.0 was used for nitrate, sulfate, chloride, and fluoride analyses. EPA method 106.1 was used for pH analyses. Nitroaromatic compound analyses were performed following USATHAMA - HPLC methodology. Analytical parameters were selected on the basis of known or suspected contaminants from WSOW and/or WSUFMP processes. Samples were analyzed by metaTRACE, Inc. of Earth City, Missouri.

2.5 SAMPLE DESCRIPTION

A soil description for each sample was recorded in the field during sample collection. The soil samples from the Material Staging Area consisted primarily of gray-brown mottled clay. The Ash Pond Isolation Dike area soil was mostly rusty-red cherty clay. The Southeast Isolation Dike soil was more varied with gray brown mottled clay, orange-gray mottled clay with sandy layers, buff dense gray silty clay, and orange-gray mottled clay with chert. The soil in the Administration Building Area consisted mostly of brown-gray mottled clay with some red-gray mottled clay. The soil in the Construction Staging Area was mostly brown-gray mottled clay with small amounts of red-gray mottled clay.

The soil sample descriptions in Appendix A address each sample interval in detail. These soils are typical of WSCP/WSRP soils which consist of the following units: Ferrelview Formation, clay till and basal till. A more detailed description of WSCP/WSRP soils is provided in the chemical soil investigation sampling plan (MK-F, 1988a).

3 DATA SUMMARY

This section presents a summary of the results of the chemical soil analyses. The detailed results of the inorganic and metals analyses are presented in Appendix B. Only those volatile, semi-volatile, PCB, and pesticide results which were above the detection limits are discussed in the following subsections. The detection limits achieved during these analyses are presented in Appendix C. These detection limits are in agreement with those required in the EPA Contract Laboratory Program (CLP).

As part of the Phase I chemical soils investigation (MK-F, 1988b), background metal concentrations across the WSS were analyzed. The results of this analysis are reproduced in Table 2. These background ranges should be considered when interpreting the concentration levels in samples taken from the five IRA and construction areas discussed in this report.

Aluminum, calcium, and magnesium are common in the clay soils present at the WSCP/WSRP. Clay particles are composed primarily of aluminum, calcium, and magnesium silicates with iron, potassium, and sodium ions readily interchangeable into the particle structure. In addition, elevated manganese levels are attributable to the presence of pyrolusite (MnO_2) in the soil.

Completion of this soil characterization program provided a large data set of inorganic anion results. The inorganic anion concentrations from this investigation and from the Phase I chemical soil characterization (MK-F, 1988b) were evaluated statistically to determine average background concentrations and ranges. Frequency histograms were plotted for each inorganic anion. These histograms were evaluated to detect concentrations outside the normal background distribution of inorganic anions. Elevated concentrations were removed from the data set prior to

TABLE 2

Statistical Data for Background Metal Concentrations in Soils at the WSCP/WSRP

Compound	Sample Size	Arithmetic Mean mg/Kg	Geometric Mean mg/Kg	Arithmetic Standard Deviation mg/Kg	Onsite Background Ranges Low mg/Kg	Onsite Background Ranges High mg/Kg
Al	142	12,536	11,350	4,902	1250	27,700
Sb	98	29	25	8	2	40
As	114	6	6	4	2	15
Ba	140	161	145	70	25	390
Be	129	1	1	1	< DL	6
Cd	125	3	3	1	< DL	7
Ca	114	3,495	3,044	1,839	190	9,300
Cr	144	24	23	6	2	42
Co	144	16	14	7	6	40
Cu	143	15	14	6	3	34
Fe	139	18,636	17,914	5,306	8,500	35,400
Pb	127	29	25	16	7	84
Li	92	10	9	3	< DL	17
Mg	133	2,437	2,256	956	417	5,900
Mn	127	495	370	334	49	1,400
Hg	Background less than the detection limit of 0.1 mg/Kg					
Ni	138	19	18	7	7	43
K	145	757	698	311	255	1,701
Se	Background less than the detection limit of 0.5 mg/Kg					
Ag	96	3	2	2	1	13
Na	136	486	437	202	49	982
Tl	Background less than the detection limit of 1.0 mg/Kg					
V	141	35	34	7	6	54
Zn	141	45	39	29	6	220

< DL - Less than detection limit

Source: MK-F, 1988b

calculating the arithmetic mean, arithmetic standard deviation, and the geometric mean. This statistical information is presented in Table 3. These background ranges were used to evaluate the data from this investigation.

3.1 MATERIAL STAGING AREA

Analyses of the samples from the Material Staging Area detected no significant concentrations of nitrate, fluoride, sulfate, chloride, or nitroaromatic compounds. However, several organic compounds were detected. Appendix B presents the results of analyses for metals and inorganic anions in the Material Staging Area samples. Table 4 summarizes the significant organic data.

Twenty-eight samples were taken from five boreholes. Phthalates were identified in 12 samples. Phthalates are usually a result of laboratory contamination. The most common source is from the leaching of sample containers and laboratory tubing. However, dimethyl phthalate and di-n-butylphthalate are constituents of explosive propellants used in fuel matrices of double base rocket propellants, and they have also been used as insecticide propellant.

Phthalates were identified in samples taken from all five areas and were not detected in any of the field blanks. Therefore, they could be widespread in the area soils at a level of about one part per million. The final determination of the effects of phthalates in WSCP/WSRP soils will be made in the overall soil characterization program.

Aldrin, a pesticide, was found in two samples from the MSA. In sample SO-51137, 101068, Aldrin was found in the 0-ft to 2-ft, 2-ft to 4-ft, 4-ft to 6-ft, and 10-ft to 12-ft samples in concentrations ranging from 20 ug/kg to 1,600 ug/kg. In sample

TABLE 3

STATISTICAL DATA FOR BACKGROUND INORGANIC ANION CONCENTRATIONS IN SOILS AT THE WSCP/WSRP

COMPOUND	SAMPLE SIZE	ARITHMETIC MEAN mg/Kg	GEOMETRIC MEAN mg/Kg	ARITHMETIC STANDARD DEVIATION mg/Kg	ONSITE BACKGROUND RANGES LOW mg/Kg	ONSITE BACKGROUND RANGES HIGH mg/Kg
Nitrate	250	2.5	1.09	2.0	0.5	10.0
Sulfate	247	33.0	23.00	27.0	1.0	110.0
Chloride	228	4.4	3.60	2.6	0.5	14.0
Fluoride	250	7.7	6.30	4.3	1.0	18.0

TABLE 4

MATERIAL STAGING AREA DATA SUMMARY

Organics

Phthalates found in 12 samples

Chemical	Concentration	Interval	Sample Location	NO.
Aldrin	240 ug/kg	(0-2')	SO-51137, 101068	2
	70 ug/kg	(2-4')	SO-51137, 101068	2
	1,600 ug/kg	(4-6')	SO-51137, 101068	2
	20 ug/kg	(10-12')	SO-51137, 101068	2
	18 ug/kg	(8-10')	SO-51500, 101190	2

SO-51500, 101190, Aldrin was found in the 8-ft to 10-ft sample at 18 ug/kg.

Aldrin is a chlorinated organic contact/fumigant insecticide. It was used to control soil insects in the 1950s and 1960s. Typically, aldrin undergoes biodegradation by oxidation to dieldrin with 75% to 100% disappearance from soils in one to six years. Dieldrin also degrades with 75% to 100% disappearance from soils in three to 25 years.

Given this biodegradation, the low concentrations detected during this investigation should not prohibit these IRA activities. The final effect of low aldrin concentrations will be evaluated in the Phase II chemical soil characterization program.

In summary, no chemical soil contamination was detected in the MSA which would effect performance of this IRA.

3.2 ASH POND ISOLATION DIKE

The Ash Pond Isolation Dike (AID) data summary (Table 5) presents the results of the analysis for detected organics, PCBs, pesticides, and nitroaromatic compounds. No elevated metal or inorganic anion concentrations were observed in AID soils.

Twenty-three samples were taken from five boreholes. The organic test results indicated phthalates in ten samples. Aroclor, a PCB, was identified in two samples at 270 ug/kg. One sample contained 1.04 ug/g of 2,4 DNT. These concentrations are well below cleanup criteria established at similar sites for the same compounds.

Most of the remaining organic compounds in Table 5 are associated with coal tar, gasoline, motor oil, and wood

TABLE 5

ASH POND DIKE DATA SUMMARY

<u>Organics</u>

Phthalates found in 10 samples.

2,4 DNT - 1.04 ug/g

Aroclor - 270 ug/kg

The following organics were identified in sample SO-51100, 100335 (8-10'):

	Concentration
Hexachlorobutadiene	17 ug/kg *
2 Methylnaphthalene	68 ug/kg *
2,4,6 trichlorophenol	68 ug/kg *
2,4,5 trichlorophenol	68 ug/kg *
2-Chloronaphthalene	110 ug/kg *
Acenaphthylene	79 ug/kg *
Dibenzofuran	68 ug/kg *
Diethylphthalate	750 ug/kg
Fluorene	45 ug/kg *
Pyrene	60 ug/kg *
Phenanthrene	54 ug/kg *
Anthracene	44 ug/kg *

* Below U.S. EPA-CLP contract required detection limits

preservatives and have been previously identified in the Ash Pond area (MK-F, 1988b). The compounds 2,4,6 trichlorophenol and 2,4,5 trichlorophenol are used widely in pesticides, fungicides, and bactericides. Hexachlorobutadiene is used as a solvent for synthetic rubber, heat transfer fluids, and washing fluids for removing hydrocarbons.

All of these compounds, with the exception of diethylphthalate, were detected below the U.S. EPA Contract Laboratory Program contract-required detection limits. These contract-required detection limits are established to detect concentrations of environmental concern. Detected concentrations below these limits should not be of concern from an environmental regulation standpoint. Appendix B presents metals and inorganic anion data for the AID samples.

The proposed IRA will not be affected by the chemical contaminants present in this area. No increase in chemical concentrations via surface discharge is expected as a result of impounding or diverting water around Ash Pond.

3.3 SOUTHEAST ISOLATION DIKE

Data for the Southeast Isolation Dike (SID) area are summarized in Table 6. These data represent 22 samples taken from five boring locations. No elevated concentrations of metals, inorganic anions, or nitroaromatic compounds were detected in the SID area. Organic analyses indicated phthalates present in six samples. Aroclor 1248, a PCB, was detected in one sample (SO-50160, 98735) in the 0-ft to 2-ft interval at 468 ug/kg. In the same sample, fluoranthene and pyrene were detected in the 2-ft to 4-ft interval, pyrene in the 4 ft to 6 ft interval, and phenol and 2-chlorophenol in the 8-ft to 10-ft interval. These compounds are associated with coal-tar by-products. Appendix B presents metal and inorganic anion data for the Southeast Isolation Dike samples.

TABLE 6
SOUTHEAST ISOLATION DIKE DATA SUMMARY

<u>Organics</u>

Phthalates found in six samples.

	Concentration
Aroclor 1248 -	1.04 ug/g
Fluoranthene -	270 ug/kg *
Phenol -	14 ug/kg *
2-Chlorophenol -	11 ug/kg *
Pyrene -	110 ug/kg *
	56 ug/kg *

* Below U.S. EPA CLP contract required detection limit.

TABLE 7
ADMINISTRATION BUILDING AREA DATA SUMMARY

Organics

Phthalates were found in 24 samples.

	CONCENTRATION	SAMPLE LOCATION	DEPTH
N-nitrosodiphenylamine -	53 ug/kg*	49101, 100500	4-6'
fluoranthene -	59 ug/kg*	49101, 100500	4-6'
pyrene -	47 ug/kg*	49101, 100500	4-6'
Methylene chloride	17 ug/kg		
	10 ug/kg		
	18 ug/kg		
Chloroethane	12 ug/kg		
2,4,6 TNT	1.4 ug/g		

Nitrates

High nitrate levels were found in sample SO-49101,100500.

CONCENTRATION	DEPTH
141 ug/g	(2-4')
1,285 ug/g	(4-6')
1,354 ug/g	(6-8')
1,297 ug/g	(8-10')
1,202 ug/g	(10-12')
1,108 ug/g	(12-14')

Sulfate - SO-49250 - 100140

CONCENTRATION	DEPTH
1,548 ug/gl	(2-4')

No chemical contamination which would impact the performance of this IRA was detected.

3.4 ADMINISTRATION BUILDING AREA

The Administration Building Area (ABA) data are summarized in Table 7. This summary represents 74 samples from 13 boring locations collected during this investigation. Samples were collected from four general locations in this area during the Phase I chemical soil sampling program (MK-F, 1988a). Several boreholes were located to confirm the past findings of elevated nitrate levels at depth in the original proposed Administration Building location. These findings were made during Phase I chemical soils characterization sampling in early 1987 (MK-F, 1988b). It was determined that the drainage from one of the major process buildings flowed under this location before the area was regraded to its current topography. Additional sample locations were also selected to evaluate other potential building locations. All ABA sampling locations and proposed building locations are presented in Figure 2.

Location SO-49101, 100500, was sampled to confirm previous detection of nitrates. These data support the previous findings of elevated nitrate levels. Elevated nitrate concentrations were detected in all intervals from 2-ft to 14-ft. The source of this contamination is a drainage ditch from WSOW Building 1-T-9 (trinitration house) which was revealed during aerial photography analysis and interpretation.

N-nitrosodiphenylamine, fluoranthene, and pyrene were also identified in the 4-ft to 6-ft sample. Chloroethane was detected in one sample at 12 ug/kg and 2,4,6 TNT was detected in one sample at 1.4 ug/g. Sulfate was detected in one sample (SO-49250 -100140) at an elevated concentration of 1,548 ug/g. Methylene chloride, a probable laboratory contaminant, was detected in three samples. Appendix B presents data on metal and inorganic anions for the Administration Building samples.

All other IRA activities discussed in this report were designed in support of remedial action and were temporary in nature. The Administration Building was a potentially permanent structure which was to be constructed in an uncontaminated area unaffected by remedial actions. For this reason, additional data were collected and presented, and further interpretations were made.

Previous investigations of WSOW contamination indicated that several process and support areas were most likely contaminated with nitroaromatic compounds. These areas include the wash house, settling tanks, wooden wastewater lines, burn areas, and wastewater lagoons. Chemical contamination from other sources was possible, but was probably less severe with respect to size and concentration than the areas mentioned above.

The siting of the ABA was evaluated using this information. None of the buildings or areas involved in the final production phases or purification process of TNT are located in the vicinity of the ABA. The closest area of concern is more than 700 ft north of the building site and is in a different drainage basin from the ABA site. All WSOW features, proposed building locations, and sampling locations are shown in Figure 3.

The closest two WSOW buildings to the ABA were Buildings 1-T-8 (Acid Recovery) and 1-T-7 (Mono-Nitration). No wastewater was generated in these process buildings. Aerial photography analysis and interpretation of 1945 imagery indicated that there were no drainage features from these process buildings through the ABA. This confirmed that wastewater was not generated.

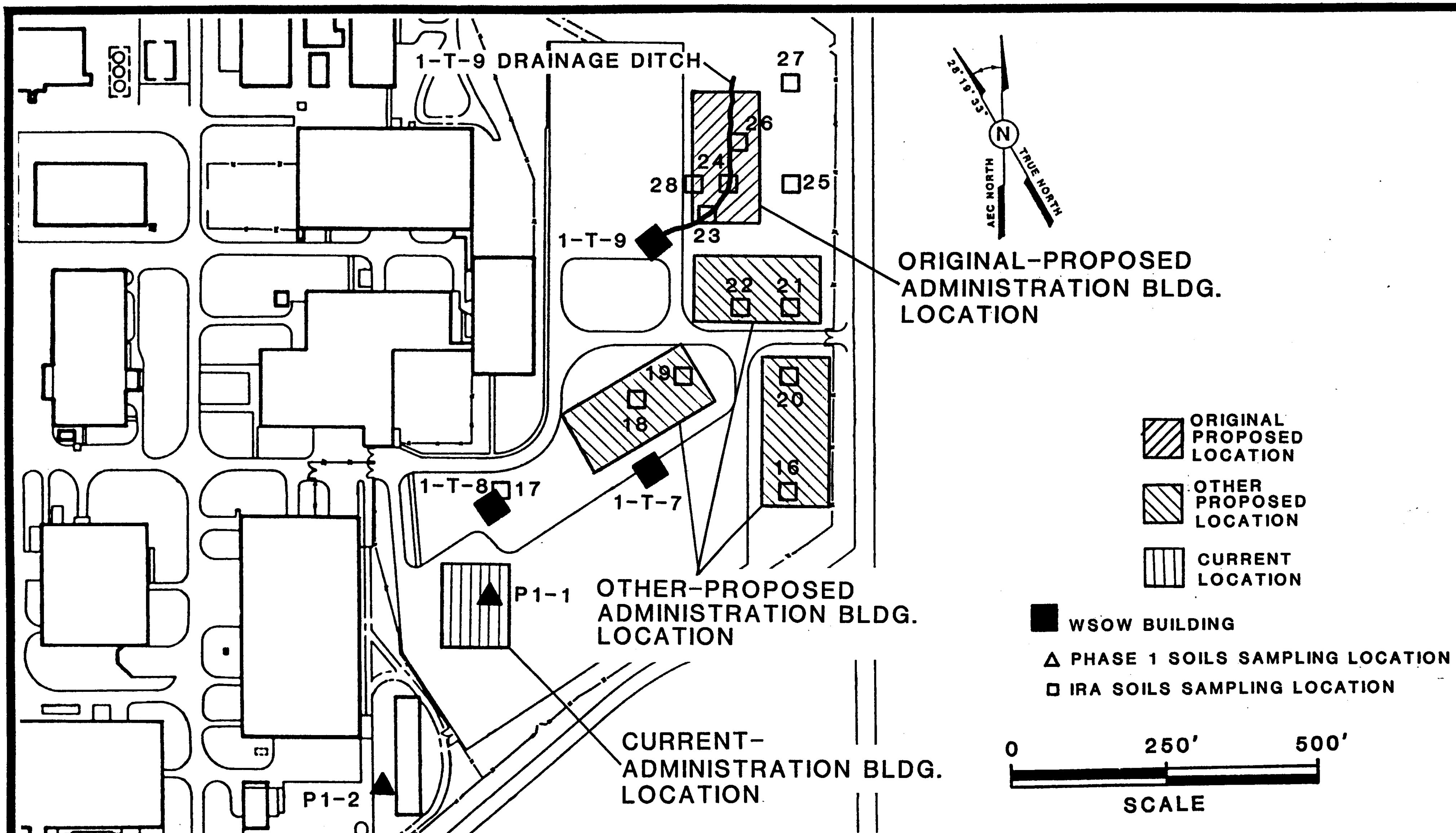

FIGURE 3

ADMINISTRATION BUILDING LOCATION AND WSOW FEATURES

The extensive decontamination efforts performed in 1954, prior to the transfer of WSOW land to the AEC, are documented (MK-F, 1988a) and appear to have been thorough. This interpretation was supported by the absence of elevated concentrations of nitroaromatic compounds in potential source areas as documented in this investigation and the Phase I chemical soil data report (MK-F, 1988b). It may be concluded that the contamination, if present, was removed in 1954.

The ABA area was used for personal vehicle parking for WSUFMP personnel. All contaminants from the process and support facilities drained away from this area. Therefore, no contamination from WSUFMP sources was expected. In addition, any chemical contamination from WSUFMP processes would likely be accompanied by elevated radioactivity levels. Field surveys and soil sample analysis have documented that radioactivity levels are not elevated in this area.

The available data indicate that chemical soil contamination is not present in the ABA and that a permanent facility could be sited at the proposed location.

3.5 CONSTRUCTION STAGING AREA

The Construction Staging Area (CSA) data indicated no chemical soil contamination from four samples taken at the two boring locations. The concentrations of all detected metals were within the background ranges for the Weldon Spring Site. The organic analysis indicated phthalates and methylene chloride present in two samples taken from the 0-ft to 7-ft interval. Both of these organic compounds are probable laboratory contaminants. No significant concentrations of nitroaromatic compounds, nitrate, sulfate, chloride, or fluoride were found.

Chemical soil contamination was not found in the area proposed to be used as a Construction Staging Area.

4 DATA QUALITY ANALYSIS

Analytical quality control procedures were performed according to EPA Contract Laboratory Program (CLP) criteria where applicable. The following summary addresses analytical conformance for GC/MS, GC/HPLC, and inorganic measures. Reference should be made to the CLP quality control requirements for specific control limits. Additional QC information on percent recoveries and duplicate analyses is presented in Appendix D.

GC/MS

The GC/MS analysis conformance summary indicated no blank contamination detected in the B/N or A/E fractions. Methylene chloride was detected in the blank VOA fraction at 2.5 ug/l. Surrogate recoveries were within required limits for the VOA fraction. Fifteen samples were not within the acceptable recovery range for the B/N, A/E fractions. All samples were analyzed within the specified holding time.

GC-(EPA/CLP)/HPLC (USATHAMA)

GC/HPLC conformance summary indicated no contaminants were detected in any of the blank samples. All samples were analyzed within specified holding times.

Metals/Inorganics

The metal/inorganic conformance summary indicated no contaminants were detected in any blank samples. All analyses were performed within specified holding times.

In summary, the data presented in this report is valid and of sufficient quality to be used in this and future assessments.

5 CONCLUSIONS

This soil sampling effort for selected interim response actions provides sufficient data of acceptable quality to support the design of the IRAs. The data from samples collected at depth from each of the five areas provide chemical characterization information pertinent to evaluating the environmental impact of the interim response action.

The data and interpretations presented in this report confirm those of previous investigations indicating limited chemical soil contamination on the WSCP/WSRP. No chemical contamination which would significantly affect the five IRAs discussed in this report was discovered.

This investigation also supported previous conclusions regarding the absence of significant nitroaromatic soil contamination.

The data presented in this report will also be used in support of the overall soil characterization as detailed in the soil sampling plan (MK-F, 1988a).

6 REFERENCES

Karelverschueren Agr University of Wageningen, Netherlands, 1983. Handbook of Environmental Data on Organic Chemicals, 2nd Edition, Van Nostrand Reinhold Co.

MK-F, 1987. Phase I Water Quality Assessment Report, DOE/OR/21548-003, December.

MK-F, 1988a. Chemical Soil Investigation Sampling Plan for the Weldon Spring Chemical Plant/Raffinate Pits, DOE/OR/21548-013, May.

MK-F, 1988b. Phase I Chemical Soil Investigation Data Report for the Weldon Spring Chemical Plant/Raffinate Pits, DOE/OR/21548-016, June.

U.S. Department of Agriculture, 1982. Soil Survey of St. Charles County, Missouri, Soil Conservation Service, May.

APPENDIX A
SOIL SAMPLE DESCRIPTION

SOIL SAMPLE DESCRIPTION

MATERIAL STAGING AREA

Sample Number: SO-51150,101207
Location: Material Staging Area
Analysis Performed: Metals, inorganics, nitroaromatics, pH, % moisture
Sample Description:

0 to 2'	6 inches of topsoil, 1.5 feet of gray-brown mottled clay
2 to 4'	2 feet gray-brown mottled clay
4 to 6'	2 feet gray-brown mottled clay
6 to 8'	6 inches gray-brown mottled clay, 1.5 feet brown clay moist
8 to 10'	2 feet wet brown clay

Sample Number: SO-51137,101068
Location: Material Staging Area
Analysis Performed: Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides, pH, % moisture
Sample Description:

0 to 2'	8 inches topsoil, 16 inches red-brown clay
2 to 4'	2 feet gray-brown mottled clay
4 to 6'	2 feet gray-brown mottled clay
6 to 8'	6 inches brown clay with black chunks; 18 inches moist brown clay
8 to 10'	6 inches brown clay; 18 inches gray-brown mottled clay
10 to 12'	2 feet gray-brown mottled clay

Sample Description: SO-51500,101190
Location: Material Staging Area
Analysis Performed: Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides, pH, % moisture
Sample Description:

0 to 2'	1 foot top soil, 1 foot red-brown clay
2 to 4'	2 feet dry gray-brown mottled clay
4 to 6'	2 feet dry gray-brown mottled clay
6 to 8'	1 foot dry gray-brown mottled clay, 1 foot same but moister with black oxide
8 to 10'	2 feet buff-brown mottled, moist
10 to 12'	18 inches buff-brown mottled, moist; 6 inches brown-black mottled moist

Sample Number:	SO-51445,101065
Location:	Material Staging Area
Analysis Performed:	Metals, inorganics, nitroaromatics, pH, % moisture
Sample Description:	
0 to 2'	8 inches topsoil, 16 inches brown-gray clay
2 to 4'	18 inches brown-gray clay, 6 inches dense gray-brown mottled clay
4 to 6'	2 feet gray-brown mottled clay, dry
6 to 8'	2 feet gray-brown mottled clay, dry
8 to 10'	2 feet gray-brown mottled clay, dry
10 to 12'	18 inches gray-brown mottled clay, 6 inches brown clay with black specks, possibly oxide

Sample Number:	SO-51360,101175
Location:	Material Staging Area
Analysis Performed:	Metal, inorganics, nitroaromatics, pH, % moisture.
Sample Description:	
0 to 2'	4 inches road rocks, 10 inches brick red clay, 10 inches brown-buff clay
2 to 4'	2 feet dry gray-brown clay
4 to 6'	2 feet dry brown-gray clay
6 to 8'	2 feet brown-gray clay
8 to 10'	2 feet brown-gray clay, gummy

ASH POND DIKE

Sample Number:	SO-51180,100335
Location:	Ash Pond Dike
Analysis Performed:	Metals, inorganics, nitroaromatics
Sample Description:	
0 to 2'	4 inches of topsoil, 20 inches buff dense but friable clay - glass beads (volcanic)
2 to 4'	20 inches buff clay with more rust color increasing with depth, 4 inches

Sample Number:	SO-51125,100260
Location:	Ash Pond Dike
Analysis Performed:	Metals, inorganics, nitroaromatics
Sample Description:	
0 to 2'	1 foot topsoil, 1 foot buff to orange loose, dry clay
2 to 4'	8 inches orange dry clay, 8 inches cherty dry clay, 8 inches rusty cherty clay
4 to 6'	2 feet red-rusty, cherty clay
6 to 8'	2 feet red-rusty, cherty clay
8 to 10'	1 foot red-rusty, cherty clay, 1 foot buff-brown, moist clay

Sample Number:	SO-51150,100220
Location:	Ash Pond Dike
Analysis Performed:	Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides
Sample Description:	
0 to 2'	2 inches topsoil, 16 inches brown-gray clay, 6 inches brown dry topsoil with chert towards bottom
2 to 4'	2 inches brown topsoil cherts, 22 inches rusty-red clay with 80% chert
4 to 6'	2 feet rusty red clay 80% chert
6 to 8'	2 feet rusty red clay 80% chert
8 to 10'	6 inches rusty red clay 80% chert, 18 inches brown moist clay, gray towards bottom 2 inches

Sample Number: SO-51100,100335
Location: Ash Pond Dike
Analysis Performed: Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides
Sample Description:

0 to 2'	6 inches topsoil - 18 inches gray-brown clay
2 to 4'	2 feet buff friable clay, rust color increases with depth
4 to 6'	2 feet of dense, moist, gray-rust mottled clay, friable at top 6 inches with black specks
6 to 8'	1 foot dense, moist, gray-rust mottled clay, 1 foot chert chunks with clay, chert 80%, clay 20%
8 to 10'	2 feet rusty clay with chert (20%)

Sample Number: SO-51308,100085
Location: Ash Pond Dike
Analysis Performed: Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	1 foot topsoil, organics layer, more topsoil (6 inches), dense gray clay - 6 inches
2 to 4'	1 foot dense gray clay, 6 inches gray clay with Fe oxide stains, 1 inch dry cherty clay with Fe oxide
4 to 6'	1 foot gray with Fe oxide stain increasing with depth to gray/brown mottled in second foot
6 to 8'	2 feet gray-rust moist dense clay
8 to 10'	2 feet gray-rust moist dense clay

SOUTHEAST ISOLATION DIKE

Sample Number:	SO-50290,98700
Location:	SE Isolation Dike
Analysis Performed:	Metals, inorganics, nitroaromatics
Sample Description:	
0 to 2'	10 inches topsoil, 10 inches gray-brown moist mottled dense clay, 4 inches clay with cherts 50%, friable
2 to 4'	14 inches brown clay with chert, 10 inches brown clay dense and friable
4 to 6'	2 feet brown-gray mottled clay, moist & dense
6 to 8'	1 foot gray-brown mottled clay, 6 inches dark gray dense clay, 6 inches same with chert

Sample Number:	SO-50140,98820
Location:	SE Isolation Dike
Analysis Performed:	Metals, inorganics nitroaromatics
Sample Description:	
0 to 2'	4 inches topsoil, 6 inches chert, 6 inches buff moist clay with 50% chert, 8 inches clay without chert
2 to 4'	20 inches orange-gray mottled, moist clay, 4 inches same but siltier
4 to 6'	2 feet orange-gray mottled moist clay with minor sandy layers
6 to 8'	2 feet orange-gray mottled clay, moist with black specks toward bottom 1 foot

Sample Number:	SO-50230,98991
Location:	SE Isolation Dike
Analysis Performed:	Metals, inorganics nitroaromatics
Sample Description:	
0 to 2'	8 inches of topsoil, 16 inches brown-rust mottled clay
2 to 4'	1 foot buff, dense clay, 1 foot buff silty clay, friable
4 to 6'	2 feet buff-gray silty clay
6 to 8'	8 inches buff-gray silty clay, 16 inches buff-gray mottled dense clay

Sample Number:	SO-50160,98735
Location:	SE Isolation Dike
Analysis Performed:	Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides
Sample Description:	
0 to 2'	8 inches topsoil, 16 inches gray silty clay
2 to 4'	2 feet dry gray clayey silt
4 to 6'	2 feet dry gray clayey silt
6 to 8'	2 feet gray silty clay - darker at top
8 to 10'	8 inches light gray loose clay, 4 inches dense, moist clay, 12 inches dense orange-gray mottled clay with chert
10 to 12'	2 feet orange-gray mottled clay

Sample Number:	SO-50252,98800
Location:	SE Isolation Dike
Analysis Performed:	Metals, inorganics, nitroaromatics
Sample Description:	
0 to 2'	4 inches topsoil, 14 inches buff, moist, dense clay, 6 inches buff-gray silty clay, friable
2 to 4'	22 inches buff-gray silty clay, 2 inches of light gray silt
4 to 6'	16 inches brick red-gray mottled clay, inches buff-gray mottled clay
6 to 8'	1 foot buff-gray mottled clay, 6 inches buff-gray mottled with black specks, 6 inches without

ADMINISTRATION BUILDING

Sample Number: SO-49475,99983
Location: Administration Building
Analysis Performed: Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	6 inches topsoil, 18 inches brown dry clay
2 to 4'	2 feet dense brown clay with small rocks
4 to 6'	8 inches brown clay, 16 inches moist soft gray clay
6 to 8'	2 feet gray moist clay
8 to 10'	2 feet gray-brown mottled clay
10 to 12'	2 feet gray-brown mottled clay

Sample Number: SO-49000,100180
Location: Administration Building
Analysis Performed: Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	6 inches of rock fill, 18 inches moist brown clay
2 to 4'	2 feet moist brown clay
4 to 6'	2 feet moist brown-gray clay
6 to 8'	2 feet most gray-brown clay

Sample Number: SO-49000,99985
Location: Administration Building
Analysis Performed: Metals, inorganics, nitroaromatics, volatiles, semi-volatiles
Sample Description:

0 to 2'	2 inches topsoil, 6 inches soil with rock fill, 8 inches dry buff clay, 8 inches moist dense buff clay
2 to 4'	2 feet gray-brown mottled clay, moist & dense
4 to 6'	2 feet gray-brown mottled clay
6 to 8'	2 feet gray-brown mottled clay

Sample Number: SO-49000,100295
Location: Administration Building
Analysis Performed Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	4 inches topsoil, 8 inches buff, dry, clay, 12 inches buff-brown mottled, hard clay
2 to 4'	2 feet buff-brown mottled clay - top 8 inches hard, lower 16 inches softer
4 to 6'	2 feet brown-gray mottled clay, moist
6 to 8'	2 feet brown-gray mottled clay, moist

Sample Number: SO-49172,100180
Location: Administration Building
Analysis Performed: Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	6 inches topsoil, 18 inches brown clay-denser and more red towards bottom
2 to 4'	1 foot brown clay, dense, 1 foot brown-gray mottled clay
4 to 6'	2 feet gray-brown clay, with some silty clay layers
6 to 8'	2 feet gray-brown clay, dense

Sample Number: SO-49250,100140
Location: Administration Building
Analysis Performed: Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	6 inches topsoil, 18 inches brown silty clay
2 to 4'	2 feet of brown clay with silty layer (1/2" thick) at 10 inches down
4 to 6'	2 feet brown-gray mottled clay
6 to 8'	2 feet brown-gray mottled clay - dense
8 to 10'	2 feet brown-gray mottled dense clay

Sample Number: SO-49000,100500
Location: Administration Building
Analysis Performed: Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	4 inches topsoil, 20 inches buff dry clay
2 to 4'	2 feet brown-buff, dry clay
4 to 6'	1 foot brown-buff, dry clay, 1 foot moist dense, brown clay
6 to 8'	2 feet sticky moist brown-gray mottled clay
8 to 10'	2 feet sticky moist brown-gray mottled clay
10 to 12'	2 feet moist brown-gray clay

Sample Number: SO-49080,100295
Location: Administration Building
Analysis Performed: Metals, inorganics, nitroaromatics
Sample Description:

0 to 2'	4 inches topsoil, 8 inches soft moist, brown clay, 12 inches hard, dense, brown clay
2 to 4'	1 foot hard brown clay, 1 foot hard brown-gray mottled clay
4 to 6'	2 feet brown-gray mottled clay
6 to 8'	2 feet brown-gray mottled clay
8 to 10'	2 feet brown-gray mottled clay - softer at bottom 1 foot

Sample Number:	SO-49082,100570
Location:	Administration Building
Analysis Performed:	Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides
Sample Description:	
0 to 2'	6 inches topsoil, 18 inches dry, buff clay
2 to 4'	2 feet dry, brown clay
4 to 6'	1 foot dry brown clay, 1 foot moist brown clay
6 to 8'	2 feet red-brown clay - moist
8 to 10'	2 feet brown-gray mottled clay - moist
10 to 12'	2 feet brown-gray mottled clay
12 to 14'	2 feet gray-brown mottled clay
14 to 16'	2 feet gray-brown mottled clay

Sample Number:	SO-49160,100500
Location:	Administration Building
Analysis Performed:	Metals, inorganics, nitroaromatics
Sample Description:	
0 to 2'	4 inches topsoil, 4 inches rock fill, 1 foot dry buff clay, 4 inches moist brown clay
2 to 4'	2 feet moist brown clay
4 to 6'	1 foot moist brown clay, 1 foot moist brown-gray clay
6 to 8'	2 feet moist brown-gray clay
8 to 10'	1 foot moist brown-gray clay, 1 foot moist brown clay
10 to 12'	2 feet moist brown clay

Sample Number:	SO-49000,100665
Location:	Administration Building
Analysis Performed:	Metals, inorganics, nitroaromatics
Sample Description:	
0 to 2'	6 inches topsoil, 8 inches moist clayey dirt, 10 inches dry brown clay
2 to 4'	2 feet dry brown clay
4 to 6'	2 feet dry brown clay
6 to 8'	1 foot dry brown clay, 1 foot moist, red-gray mottled clay
8 to 10'	2 feet moist red-gray mottled clay
10 to 12'	1 foot moist red-gray mottled clay, 1 foot moist brown clay

Sample Number:	SO-49101,100500
Location:	Administration Building
Analysis Performed:	Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides
Sample Description:	

0 to 2'	4 inches topsoil, 20 inches dry, buff clay
2 to 4'	2 feet dry brown clay, harder at bottom
4 to 6'	2 feet soft, moist brown clay
6 to 8'	2 feet soft, moist brown-gray mottled clay
8 to 10'	2 feet soft, moist brown-gray mottled clay
10 to 12'	2 feet soft, moist brown-gray mottled clay
12 to 14'	2 feet soft, moist gray-brown mottled clay
14 to 16'	2 feet soft, moist brown-gray mottled clay

Sample Number:	SO-49132,100440
Location:	Administration Building
Analysis Performed:	Metals, inorganics, nitroaromatics, semi-volatiles, PCBs, pesticides
Sample Description:	

0 to 2'	4 inches soil, 20 inches brown-gray clay, dense
2 to 4'	2 feet hard brown-gray clay
4 to 6'	2 feet hard brown-gray clay, moist
6 to 8'	2 feet hard brown-gray clay
8 to 10'	2 feet hard brown-gray clay
10 to 12'	2 feet hard brown-gray clay
12 to 14'	1 foot hard brown-gray clay, 1 foot softer brown clay

CONSTRUCTION STAGING AREA

Sample Number:	SO-50800,98150
Location:	Construction Staging Area
Analysis Performed:	Metals, inorganics, nitroaromatics, volatiles, semi-volatiles, PCBs, pesticides, pH, % moisture
Sample Description:	
0 to 7'	12 inches topsoil, gray-brown mottled clay
8 to 15'	gray-brown mottled clay

Sample Number:	SO-50950,98300
Location:	Construction Staging Area
Analysis Performed:	Metals, inorganics, nitroaromatics, volatiles, semi-volatiles, PCBs, pesticides, pH, % moisture
Sample Description:	
0 to 7'	6 inches topsoil, gray-brown mottled clay
8 to 15'	gray-brown mottled clay

APPENDIX B
ANALYTICAL DATA - METALS, INORGANIC ANIONS

TABLE B-1

ADMINISTRATION BUILDING AREA IRA SOILS RESULTS - ANIONS

LOCATION	DATE SAMPLED	CONCENTRATION (UG/G)			
		CHLORIDE	FLOURIDE	NITRATE	SULFATE
SO-49000,100180-0,2-1187	11/11/87	1.07	12.44	2.68	91.62
SO-49000,100180-2,4-1187	11/11/87	4.40	21.13	1.87	58.11
SO-49000,100180-4,6-1187	11/11/87	1.53	17.60	2.84	28.30
SO-49000,100180-6,8-1187	11/11/87	9.61	19.64	3.59	19.15
SO-49000,100295-0,2-1187	11/11/87	1.93	9.66	4.52	33.57
SO-49000,100295-2,4-1187	11/11/87	12.79	9.76	1.73	163.41
SO-49000,100295-4,6-1187	11/11/87	19.39	12.10	1.40	27.73
SO-49000,100295-6,8-1187	11/11/87	13.09	14.88	5.51	31.91
SO-49000,100500-0,2-1187	11/12/87	1.60	9.72	2.63	39.47
SO-49000,100500-10,12-1187	11/12/87	1.08	7.20	3.48	8.16
SO-49000,100500-2,4-1187	11/12/87	0.46	10.04	1.15	60.38
SO-49000,100500-4,6-1187	11/12/87	0.61	5.99	0.98	37.38
SO-49000,100500-6,8-1187	11/12/87	1.01	7.92	2.89	15.97
SO-49000,100500-8,10-1187	11/12/87	1.09	7.88	1.33	12.13
SO-49000,100665-0,2-1187	11/12/87	2.00	1.88	0.94	41.20
SO-49000,100665-10,12-1187	11/12/87	5.35	13.75	2.04	8.91
SO-49000,100665-2,4-1187	11/12/87	4.84	12.96	3.27	127.31
SO-49000,100665-4,6-1187	11/12/87	2.63	15.65	1.43	136.20
SO-49000,100665-6,8-1187	11/12/87	9.87	9.74	3.01	46.32
SO-49000,100665-8,10-1187	11/12/87	9.58	12.43	2.72	49.83
SO-49000,99985-0,2-1187	11/11/87	2.94	9.28	ND	74.90
SO-49000,99985-2,4-1187	11/11/87	25.74	8.80	7.72	327.44
SO-49000,99985-4,6-1187	11/11/87	48.71	12.54	2.85	59.93
SO-49000,99985-6,8-1187	11/11/87	5.45	16.25	1.81	20.97
SO-49080,100295-0,2-1187	11/12/87	3.34	6.08	2.62	26.25
SO-49080,100295-2,4-1187	11/12/87	2.32	12.30	1.16	76.84
SO-49080,100295-4,6-1187	11/12/87	1.07	13.48	0.54	3.53
SO-49080,100295-6,8-1187	11/12/87	1.20	21.40	1.67	4.30
SO-49080,100295-8,10-1187	11/12/87	0.84	12.86	2.88	8.05
SO-49082,100570-0,2-1187	11/12/87	1.59	7.48	4.31	32.29
SO-49082,100570-10,12-1187	11/12/87	45.3	2.98	6.2	21.34
SO-49082,100570-12,14-1187	11/12/87	1.17	11.15	5.4	17.36
SO-49082,100570-14,16-1187	11/12/87	0.94	6.95	2.47	13.66
SO-49082,100570-2,4-1187	11/12/87	3.09	9.15	1.26	140.7
SO-49082,100570-4,6-1187	11/12/87	4.93	6.11	1.29	106.91
SO-49082,100570-6,8-1187	11/12/87	5.77	8.85	8.2	25.64
SO-49082,100570-8,10-1187	11/12/87	5.17	7.87	2.95	32.61
SO-49101,100500-0,2-1187	11/12/87	1.3	9.53	3.58	34.24
SO-49101,100500-10,12-1187	11/12/87	1.43	1.55	1202.49	8.61
SO-49101,100500-12,14-1187	11/12/87	1.58	1.58	1108.81	12.92
SO-49101,100500-14,16-1187	11/12/87	1.32	1.44	53.9	11.5
SO-49101,100500-2,4-1187	11/12/87	0.93	ND	141.32	88.38
SO-49101,100500-4,6-1187	11/12/87	1.11	1.11	1285.56	7.02
SO-49101,100500-6,8-1187	11/12/87	1.58	1.21	1354.64	6.68

TABLE B-1 (continued)

ADMINISTRATION BUILDING AREA IRA SOILS RESULTS - ANIONS

LOCATION	DATE SAMPLED	CONCENTRATION (UG/G) CHLORIDE	FLOURIDE	NITRATE	SULFATE
SO-49101,100500-8,10-1187	11/12/87	1.49	1.49	1297.08	6.81
SO-49132,100440-0,2-1187	11/12/87	1.40	4.55	3.27	77.56
SO-49132,100440-10,12-1187	11/12/87	0.85	8.41	2.68	15.48
SO-49132,100440-12,14-1187	11/12/87	0.83	5.13	2.62	13.23
SO-49132,100440-14,16-1187	11/12/87	54.93	2.52	3.49	18.75
SO-49132,100440-2,4-1187	11/12/87	0.83	5.01	1.07	129.93
SO-49132,100440-4,6-1187	11/12/87	0.95	11.19	1.9	16.79
SO-49132,100440-6,8-1187	11/12/87	0.7	12.39	3.39	13.32
SO-49132,100440-8,10-1187	11/12/87	1.06	9.78	8.72	11.19
SO-49160,100500-0,2-1187	11/12/87	3.54	10.06	1.49	46.31
SO-49160,100500-10,12-1187	11/12/87	4.86	10.94	4.13	6.69
SO-49160,100500-2,4-1187	11/12/87	3.87	10.89	2.42	35.93
SO-49160,100500-4,6-1187	11/12/87	5.97	15.45	2.11	5.97
SO-49160,100500-6,8-1187	11/12/87	4.87	14.71	3.68	5.46
SO-49160,100500-8,10-1187	11/12/87	4.40	13.56	2.62	5.35
SO-49172,100180-0,2-1187	11/11/87	9.77	13.49	2.76	170.77
SO-49172,100180-2,4-1187	11/11/87	25.59	12.19	2.66	237.63
SO-49172,100180-4,6-1187	11/11/87	30.12	11.81	1.09	14.94
SO-49172,100180-6,8-1187	11/11/87	26.00	14.26	7.48	16.30
SO-49250,100140-0,2-1187	11/10/87	2.36	10.87	0.82	136.90
SO-49250,100140-2,4-1187	11/10/87	7.88	5.93	1.08	1548.14
SO-49250,100140-4,6-1187	11/10/87	22.58	11.72	4.00	17.94
SO-49250,100140-6,8-1187	11/10/87	1.60	11.66	1.14	30.86
SO-49250,100140-8,10-1187	11/10/87	0.86	12.92	1.80	14.34
SO-49475,99985-0,2-1187	11/10/87	1.82	8.53	12.97	89.22
SO-49475,99985-10,12-1187	11/10/87	4.07	19.39	3.78	15.42
SO-49475,99985-2,4-1187	11/10/87	1.81	5.69	9.86	116.34
SO-49475,99985-4,6-1187	11/10/87	4.17	8.57	2.25	43.04
SO-49475,99985-6,8-1187	11/10/87	5.55	10.75	12.45	25.25
SO-49475,99985-8,10-1187	11/10/87	4.88	13.25	2.85	11.95

TABLE B-1

ADMINISTRATION BUILDING AREA IRA SOILS RESULTS - ANIONS

LOCATION	DATE SAMPLED	CONCENTRATION (UG/G) CHLORIDE	FLOURIDE	NITRATE	SULFATE
SO-49000,100180-0,2-1187	11/11/87	1.07	12.44	2.68	91.62
SO-49000,100180-2,4-1187	11/11/87	4.40	21.13	1.87	58.11
SO-49000,100180-4,6-1187	11/11/87	1.53	17.60	2.84	28.30
SO-49000,100180-6,8-1187	11/11/87	9.61	19.64	3.59	19.15
SO-49000,100295-0,2-1187	11/11/87	1.93	9.66	4.52	33.57
SO-49000,100295-2,4-1187	11/11/87	12.79	9.76	1.73	163.41
SO-49000,100295-4,6-1187	11/11/87	19.39	12.10	1.40	27.73
SO-49000,100295-6,8-1187	11/11/87	13.09	14.88	5.51	31.91
SO-49000,100500-0,2-1187	11/12/87	1.60	9.72	2.63	39.47
SO-49000,100500-10,12-1187	11/12/87	1.08	7.20	3.48	8.16
SO-49000,100500-2,4-1187	11/12/87	0.46	10.04	1.15	60.38
SO-49000,100500-4,6-1187	11/12/87	0.61	5.99	0.98	37.38
SO-49000,100500-6,8-1187	11/12/87	1.01	7.92	2.89	15.97
SO-49000,100500-8,10-1187	11/12/87	1.09	7.88	1.33	12.13
SO-49000,100665-0,2-1187	11/12/87	2.00	1.88	0.94	41.20
SO-49000,100665-10,12-1187	11/12/87	5.35	13.75	2.04	8.91
SO-49000,100665-2,4-1187	11/12/87	4.84	12.96	3.27	127.31
SO-49000,100665-4,6-1187	11/12/87	2.63	15.65	1.43	136.20
SO-49000,100665-6,8-1187	11/12/87	9.87	9.74	3.01	46.32
SO-49000,100665-8,10-1187	11/12/87	9.58	12.43	2.72	49.83
SO-49000,99985-0,2-1187	11/11/87	2.94	9.28	ND	74.90
SO-49000,99985-2,4-1187	11/11/87	25.74	8.80	7.72	327.44
SO-49000,99985-4,6-1187	11/11/87	48.71	12.54	2.85	59.93
SO-49000,99985-6,8-1187	11/11/87	5.45	16.25	1.81	20.97
SO-49080,100295-0,2-1187	11/12/87	3.34	6.08	2.62	26.25
SO-49080,100295-2,4-1187	11/12/87	2.32	12.30	1.16	76.84
SO-49080,100295-4,6-1187	11/12/87	1.07	13.48	0.54	3.53
SO-49080,100295-6,8-1187	11/12/87	1.20	21.40	1.67	4.30
SO-49080,100295-8,10-1187	11/12/87	0.84	12.86	2.88	8.05
SO-49082,100570-0,2-1187	11/12/87	1.59	7.48	4.31	32.29
SO-49082,100570-10,12-1187	11/12/87	45.3	2.98	6.2	21.34
SO-49082,100570-12,14-1187	11/12/87	1.17	11.15	5.4	17.36
SO-49082,100570-14,16-1187	11/12/87	0.94	6.95	2.47	13.66
SO-49082,100570-2,4-1187	11/12/87	3.09	9.15	1.26	140.7
SO-49082,100570-4,6-1187	11/12/87	4.93	6.11	1.29	106.91
SO-49082,100570-6,8-1187	11/12/87	5.77	8.85	8.2	25.64
SO-49082,100570-8,10-1187	11/12/87	5.17	7.87	2.95	32.61
SO-49101,100500-0,2-1187	11/12/87	1.3	9.53	3.58	34.24
SO-49101,100500-10,12-1187	11/12/87	1.43	1.55	1202.49	8.61
SO-49101,100500-12,14-1187	11/12/87	1.58	1.58	1108.81	12.92
SO-49101,100500-14,16-1187	11/12/87	1.32	1.44	53.9	11.5
SO-49101,100500-2,4-1187	11/12/87	0.93	ND	141.32	88.38
SO-49101,100500-4,6-1187	11/12/87	1.11	1.11	1285.56	7.02
SO-49101,100500-6,8-1187	11/12/87	1.58	1.21	1354.64	6.68

TABLE B-1 (continued)

ADMINISTRATION BUILDING AREA IRA SOILS RESULTS - ANIONS

LOCATION	DATE SAMPLED	CONCENTRATION (UG/G) CHLORIDE	FLOURIDE	NITRATE	SULFATE
SO-49101,100500-8,10-1187	11/12/87	1.49	1.49	1297.08	6.81
SO-49132,100440-0,2-1187	11/12/87	1.40	4.55	3.27	77.56
SO-49132,100440-10,12-1187	11/12/87	0.85	8.41	2.68	15.48
SO-49132,100440-12,14-1187	11/12/87	0.83	5.13	2.62	13.23
SO-49132,100440-14,16-1187	11/12/87	54.93	2.52	3.49	18.75
SO-49132,100440-2,4-1187	11/12/87	0.83	5.01	1.07	129.93
SO-49132,100440-4,6-1187	11/12/87	0.95	11.19	1.9	16.79
SO-49132,100440-6,8-1187	11/12/87	0.7	12.39	3.39	13.32
SO-49132,100440-8,10-1187	11/12/87	1.06	9.78	8.72	11.19
SO-49160,100500-0,2-1187	11/12/87	3.54	10.06	1.49	46.31
SO-49160,100500-10,12-1187	11/12/87	4.86	10.94	4.13	6.69
SO-49160,100500-2,4-1187	11/12/87	3.87	10.89	2.42	35.93
SO-49160,100500-4,6-1187	11/12/87	5.97	15.45	2.11	5.97
SO-49160,100500-6,8-1187	11/12/87	4.87	14.71	3.68	5.46
SO-49160,100500-8,10-1187	11/12/87	4.40	13.56	2.62	5.35
SO-49172,100180-0,2-1187	11/11/87	9.77	13.49	2.76	170.77
SO-49172,100180-2,4-1187	11/11/87	25.59	12.19	2.66	237.63
SO-49172,100180-4,6-1187	11/11/87	30.12	11.81	1.09	14.94
SO-49172,100180-6,8-1187	11/11/87	26.00	14.26	7.48	16.30
SO-49250,100140-0,2-1187	11/10/87	2.36	10.87	0.82	136.90
SO-49250,100140-2,4-1187	11/10/87	7.88	5.93	1.08	1548.14
SO-49250,100140-4,6-1187	11/10/87	22.58	11.72	4.00	17.94
SO-49250,100140-6,8-1187	11/10/87	1.60	11.66	1.14	30.86
SO-49250,100140-8,10-1187	11/10/87	0.86	12.92	1.80	14.34
SO-49475,99985-0,2-1187	11/10/87	1.82	8.53	12.97	89.22
SO-49475,99985-10,12-1187	11/10/87	4.07	19.39	3.78	15.42
SO-49475,99985-2,4-1187	11/10/87	1.81	5.69	9.86	116.34
SO-49475,99985-4,6-1187	11/10/87	4.17	8.57	2.25	43.04
SO-49475,99985-6,8-1187	11/10/87	5.55	10.75	12.45	25.25
SO-49475,99985-8,10-1187	11/10/87	4.88	13.25	2.85	11.95

TABLE B-2

ADMINISTRATION BUILDING AREA IRA SOILS RESULTS - METALS

Location	Date Sampled	Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Ni	K	Se	Ag	Na	Tl	V	Zn
		Concentration (UG/G)																							
SO-49000,100180-0,2-1187	11/11/87	14481	ND	16.6	248	1.2	ND	13627	21.1	17.6	9.5	21459	23.9	6.5	2857	1440	ND	15.6	ND	ND	ND	ND	ND	47.2	23.2
SO-49000,100180-2,4-1187	11/11/87	30009	ND	34	98	1	ND	4584	31.8	ND	10.8	24651	4.5	11.2	3494	86.4	ND	14.3	ND	ND	ND	ND	ND	49.8	33.8
SO-49000,100180-4,6-1187	11/11/87	13658	ND	16.7	95.2	0.9	ND	3667	17.1	ND	7.3	14655	6.9	ND	2166	74.4	ND	10.5	ND	ND	ND	ND	ND	33.8	18.5
SO-49000,100180-6,8-1187	11/11/87	16070	ND	8.9	80	0.9	ND	3249	37.2	ND	8.4	16267	8.2	ND	2075	104	ND	15.7	ND	ND	ND	ND	ND	37.4	21.4
SO-49000,100295-0,2-1187	11/11/87	11272	ND	13.0	234	0.9	0.7	3602	19.0	15.5	8.0	18300	20.7	6.7	2086	1514	ND	15.0	ND	ND	ND	ND	ND	40.5	28.3
SO-49000,100295-2,4-1187	11/11/87	13665	ND	22.7	127	0.9	ND	3594	21.9	17.3	8.2	17975	14.3	ND	2297	341	ND	11.7	ND	ND	ND	ND	ND	41.7	19.2
SO-49000,100295-4,6-1187	11/11/87	11027	ND	20.7	223	0.8	ND	3115	1215	ND	7.5	12948	7.5	ND	1715	38.7	ND	9.2	ND	ND	ND	ND	ND	32.7	14.2
SO-49000,100295-6,8-1187	11/11/87	15873	ND	31.7	59.0	1.2	ND	3365	23.8	ND	10.7	19988	11.5	ND	2022	93.2	ND	15.4	ND	ND	ND	ND	ND	44.4	21.4
SO-49000,100500-0,2-1187	11/12/87	14758	6.0	10.2	253	0.9	1.5	3472	25.2	11.4	20.8	20135	11.4	15.2	3615	705	0.1	27.2	952	ND	1.5	ND	ND	43.5	49.0
SO-49000,100500-10,12-1187	11/12/87	12046	ND	7.3	57.88	1.0	ND	3455	14.2	6.7	10.4	13125	15.1	ND	1704	46	ND	12.0	ND	ND	ND	ND	ND	42.2	16.6
SO-49000,100500-2,4-1187	11/12/87	10638	ND	7.9	195	0.7	0.9	2113	17.9	11.3	13.2	14916	14.5	8.9	2101	802	ND	12.5	ND	ND	1.3	ND	ND	33.9	27.0
SO-49000,100500-4,6-1187	11/12/87	25260	ND	2.3	299	1.2	1.2	3151	31.3	27.5	14.2	27605	35.8	13.6	3054	1747	ND	18.7	666	ND	2.0	ND	ND	64.4	35.2
SO-49000,100500-6,8-1187	11/12/87	16432	ND	8.8	88	0.8	0.8	3809	19.5	ND	13.5	17551	15.3	ND	23.26	56.6	ND	10.9	ND	ND	1.2	ND	ND	42.2	22.4
SO-49000,100500-8,10-1187	11/12/87	16139	ND	10.0	59.1	0.7	0.6	3201	19.5	ND	11.6	14381	13.2	ND	2031	30.9	ND	13.5	ND	ND	1.0	ND	ND	31.8	22.2
SO-49000,100665-0,2-1187	11/12/87	14044	ND	29.4	142	1.1	ND	3396	21.7	11.2	23	21507	12.4	8.9	2690	534	ND	21.1	717	ND	1.3	ND	ND	38.7	42.7
SO-49000,100665-10,12-1187	11/12/87	12147	ND	10.8	78	0.8	ND	3877	28.3	ND	8.2	14375	8.9	ND	1690	46.1	ND	15.3	ND	ND	ND	ND	ND	35.5	14.1
SO-49000,100665-2,4-1187	11/12/87	10528	ND	9.2	229	0.8	ND	1611	17.2	10.9	7.5	13813	8.9	8.7	2005	610	ND	18.6	ND	ND	ND	ND	ND	31	28.3
SO-49000,100665-4,6-1187	11/12/87	10717	ND	11.1	164	0.7	ND	1846	21.1	11.1	6.7	15854	12.9	6.6	1691	685	ND	9.7	ND	ND	ND	ND	ND	36	22
SO-49000,100665-6,8-1187	11/12/87	13234	ND	10.9	154	0.6	ND	2563	31.2	6.7	5.9	13607	9.5	7.6	1991	437	ND	14.7	ND	ND	ND	ND	ND	28.9	19.6
SO-49000,100665-8,10-1187	11/12/87	16192	ND	13.8	87	0.8	ND	4090	19	ND	11.6	19324	10.5	ND	1935	50.7	ND	7.9	ND	ND	ND	681	ND	39.3	17.3
SO-49000,99985-0,2-1187	11/11/87	11870	6.0	9.7	157	0.9	ND	4670	21.7	10.0	7.0	17022	10.7	7.5	2667	557	ND	13.2	ND	ND	ND	ND	ND	38.8	28.1
SO-49000,99985-2,4-1187	11/11/87	13528	ND	27.6	261	1.0	ND	4293	22.2	8.9	7.7	18744	15.7	ND	2527	404	ND	13.0	ND	ND	ND	707	ND	46.2	20.9
SO-49000,99985-4,6-1187	11/11/87	11343	ND	14.5	441	0.7	ND	4006	13.0	9.2	7.0	10618	10.2	ND	2141	66.5	ND	8.5	ND	ND	ND	ND	ND	25.8	16.0
SO-49000,99985-6,8-1187	11/11/87	10260	ND	13.2	150	0.9	ND	3361	12.5	ND	7.3	11709	11.4	ND	1772	62	ND	9.5	ND	ND	ND	ND	ND	32.1	15.2
SO-49080,100295-0,2-1187	11/12/87	16547	ND	7.6	169	0.8	0.8	3770	22.9	ND	13.4	18015	13.5	7.0	2601	99	ND	13.6	ND	ND	1.4	ND	ND	38.9	27.4
SO-49080,100295-2,4-1187	11/12/87	15103	ND	7.1	112	0.8	ND	2925	17.6	ND	9.5	14045	14.6	ND	2234	78.8	ND	11.5	ND	ND	ND	ND	ND	27.0	22.9
SO-49080,100295-4,6-1187	11/12/87	18771	ND	3.9	113	1.2	0.5	2815	19.4	8.7	10.6	16192	11.7	ND	2515	81.4	ND	15.2	682	ND	ND	ND	ND	31.0	28.5
SO-49080,100295-6,8-1187	11/12/87	14060	ND	4.4	110	1.2	0.6	3013	14.2	ND	7.7	10736	10.6	ND	1961	55.1	ND	12.3	ND	ND	ND	ND	ND	17.2	20.6
SO-49080,100295-8,10-1187	11/12/87	14231	7.6	8.1	163	1.4	ND	3371	18.1	23.8	8.7	14063	15.9	ND	1959	238	ND	16.5	ND	ND	ND	ND	ND	27.3	20.0
SO-49082,100570-0,2-1187	11/12/87	8681	ND	16.5	220	0.8	ND	2878	17	8	15.9	17188	6.3	6.2	2680	459	ND	17.7	ND	ND	ND	ND	ND	27.6	41.1
SO-49082,100570-10,12-1187	11/12/87	12361	ND	16	38	0.8	ND	3195	24.2	ND	6.2	9399	9.2	ND	1583	23	ND	14.4	ND	ND	ND	ND	ND	24.2	15
SO-49082,100570-12,14-1187	11/12/87	11897	ND	8.7	40.9	1.2	ND	4065	14.4	ND	6.3	8371	7.2	ND	1842	20	ND	11.3	ND	ND	ND	ND	ND	21.8	14.4

TABLE B-2 (continued)

ADMINISTRATION BUILDING AREA IRA SOILS RESULTS - METALS

Location	Date Sampled	Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Ni	K	Se	Ag	Na	Tl	V	Zn
		Concentration (UG/G)																							
SO-49082,100570-14,16-1187	11/12/87	13055	ND	10.6	39.8	1.3	ND	3932	34	14.2	8.2	11065	4.2	ND	1895	64	ND	23.5	ND	ND	ND	ND	ND	19.3	19.4
SO-49082,100570-2,4-1187	11/12/87	7401	ND	10	175	0.8	ND	1865	16	7.9	36.5	13910	7.7	ND	1830	611	ND	14.2	ND	ND	ND	ND	ND	30	26.4
SO-49082,100570-4,6-1187	11/12/87	13687	ND	13.6	128	0.8	ND	2532	64	9.3	8.3	15543	7.5	6.1	2074	246	ND	35	ND	ND	ND	ND	ND	31.8	25.7
SO-49082,100570-6,8-1187	11/12/87	13101	ND	21.5	76	ND	ND	3820	22.4	ND	8.7	15895	10.9	ND	2025	49.1	ND	11.2	ND	ND	ND	ND	ND	34.2	17
SO-49082,100570-8,10-1187	11/12/87	13498	ND	25.1	56.4	1.2	ND	3814	25.2	ND	13.5	20020	12.7	ND	1846	32.6	ND	15.6	ND	ND	ND	ND	ND	60	18.7
SO-49101,100500-0,2-1187	11/12/87	9280	ND	7.6	145	0.8	ND	2958	17.6	9	10.5	13738	7.7	7.9	2167	758	ND	19.8	ND	ND	ND	ND	ND	28.5	28.8
SO-49101,100500-10,12-1187	11/12/87	14822	ND	7.8	43.4	1.3	ND	3407	17.2	14.5	11.1	15563	14.3	ND	1978	96	ND	13.3	ND	ND	ND	ND	ND	31.3	21.4
SO-49101,100500-12,14-1187	11/12/87	14091	ND	5.6	37.8	1.7	ND	3931	15.6	8.8	7.6	8130	5.4	6.7	1993	65.5	ND	10	ND	ND	ND	ND	ND	24	18.3
SO-49101,100500-14,16-1187	11/12/87	11756	ND	4.7	106	2.5	0.7	3869	18.7	69.8	11.1	18493	37.8	ND	1994	814	ND	38.3	ND	ND	ND	ND	ND	32.9	24.7
SO-49101,100500-2,4-1187	11/12/87	19819	ND	11.2	178	1	ND	2427	27.6	10.1	10.5	18707	5	10.8	2485	433	ND	15.5	ND	ND	ND	ND	ND	39.7	29.1
SO-49101,100500-4,6-1187	11/12/87	11741	ND	10	36	0.6	ND	3140	13.9	6.9	7.6	11353	7.3	ND	1835	48.8	ND	8.7	ND	ND	ND	ND	ND	24.8	15.5
SO-49101,100500-6,8-1187	11/12/87	11584	ND	11.6	38.1	0.9	ND	3566	15.2	ND	10	15053	10.7	ND	1804	74.5	ND	8.4	ND	ND	ND	ND	ND	36.4	14.8
SO-49101,100500-8,10-1187	11/12/87	14569	ND	14.4	37.8	1.1	ND	4101	16.5	ND	11.4	14507	7.7	ND	2112	100	ND	10.3	ND	ND	ND	ND	ND	27.3	19.6
SO-49132,100440-0,2-1187	11/12/87	13343	7.2	8.7	157	0.9	0.9	14707	24.4	8.9	11.3	16049	19.2	ND	3831	360	ND	16.0	583	ND	1.2	ND	ND	36.4	35.3
SO-49132,100440-10,12-1187	11/12/87	13601	ND	2.9	56.8	1.1	ND	3444	14.1	ND	5.6	9001	4.4	ND	1944	73.5	ND	9	ND	ND	ND	ND	ND	9.6	19.6
SO-49132,100440-12,14-1187	11/12/87	9493	ND	8	153	1.2	ND	3522	10.3	12.6	11.4	11306	30.4	ND	1704	805	ND	26.3	ND	ND	ND	ND	ND	24.2	14.7
SO-49132,100440-14,16-1187	11/12/87	12524	ND	14.9	59.4	1.2	ND	3425	17.5	ND	10.9	20505	8.3	ND	1809	173	ND	20.9	ND	ND	ND	ND	ND	38.3	20.2
SO-49132,100440-2,4-1187	11/12/87	12004	ND	9.2	53.5	0.8	ND	3075	16.6	ND	8.9	14722	15.6	ND	2003	62	ND	10.0	ND	ND	ND	ND	ND	28.7	18.5
SO-49132,100440-4,6-1187	11/12/87	17310	7.4	10.8	82	1.7	ND	3214	35.7	8.5	13.2	25155	18.5	ND	2113	133	ND	15.5	ND	ND	1.3	ND	ND	51.1	25.4
SO-49132,100440-6,8-1187	11/12/87	10290	7	4.4	67	1.2	0.6	3173	10.5	14.4	5.6	6217	12.2	ND	1668	382	ND	14.7	ND	ND	ND	ND	ND	7.2	15.1
SO-49132,100440-8,10-1187	11/12/87	10114	8	4.9	56.3	1.4	ND	3040	13.3	ND	8.2	11970	12.1	ND	1620	92	ND	10.4	ND	ND	ND	ND	ND	23.6	17.3
SO-49160,100500-0,2-1187	11/12/87	11417	ND	26.3	172	0.8	ND	14041	24.9	8.5	10.2	14578	10.4	7.2	4269	485	ND	16.8	ND	ND	1.3	ND	ND	32.6	27.6
SO-49160,100500-10,12-1187	11/12/87	18716	ND	14.8	89.4	1.9	ND	3770	51.7	13.4	110	18363	9.2	6.2	2250	135	ND	38.1	ND	ND	ND	ND	ND	39.5	28.1
SO-49160,100500-2,4-1187	11/12/87	18074	ND	7.7	129	1.3	ND	3012	35	7.9	13.3	31091	29	6.7	2293	331	ND	22.7	680	ND	1.6	ND	ND	71.3	25.9
SO-49160,100500-4,6-1187	11/12/87	16175	ND	9.8	114	0.7	ND	3066	23.3	6.3	9.2	14419	11.9	ND	2288	81	ND	12.3	620	ND	ND	ND	ND	29.8	24.5
SO-49160,100500-6,8-1187	11/12/87	10407	ND	8.9	105	0.7	ND	2979	17.1	ND	67.5	9511	3.9	ND	1780	79	ND	10.8	ND	ND	ND	ND	ND	19.3	14.8
SO-49160,100500-8,10-1187	11/12/87	12298	ND	16.2	125	1.3	ND	3336	23.8	23.3	80	13285	7	ND	1891	315	ND	20.1	ND	ND	ND	ND	ND	28.9	17.8
SO-49172,100180-0,2-1187	11/11/87	15763	ND	16.2	219	1.0	ND	3851	33.6	7.6	10.7	20970	13.1	ND	2437	263	ND	15.2	ND	ND	ND	ND	ND	43.3	24.5
SO-49172,100180-2,4-1187	11/11/87	15123	ND	23.0	155	0.9	ND	3162	19.0	ND	14.5	17231	4.4	27.7	2102	53.4	ND	10.4	ND	ND	ND	ND	ND	35.0	20.0
SO-49172,100180-4,6-1187	11/11/87	13699	ND	16.4	470	0.8	ND	3114	16.3	ND	11.3	14325	4.3	6.9	2010	51	0.12	9.9	ND	ND	ND	ND	ND	38.1	19.1
SO-49172,100180-6,8-1187	11/11/87	16667	ND	16.5	159	1	ND	2900	18.3	6.7	8.5	13851	4.3	ND	2277	77	ND	12.2	ND	ND	ND	ND	ND	28.8	24.1
SO-49250,100140-0,2-1187	11/10/87	11526	ND	22.9	228	1	ND	4113	29.1	10.2	9.4	18636	12.8	6.9	2461	707	ND	12.8	622	ND	ND	ND	ND	39.5	33.1
SO-49250,100140-2,4-1187	11/10/87	14333	ND	10.1	198	1	ND	2627	20	ND	7.2	19172	9.9	ND	1731	153	ND	10.5	ND	ND	ND	ND	ND	42.8	16.5
SO-49250,100140-4,6-1187	11/10/87	14315	ND	16.4	198	1	ND	2624	19.9	ND	7.2	11344	5.1	ND	2030	30.1	ND	10.1	ND	ND	ND	ND	ND	23.3	18.3

TABLE B-2 (continued)

ADMINISTRATION BUILDING AREA IRA SOILS RESULTS - METALS

Location	Date Sampled	Concentration (UG/G) Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Ni	K	Se	Ag	Na	Tl	V	Zn
SO-49250,100140-6,8-1187	11/10/87	12953	ND	8.2	123	0.9	ND	2916	15.6	ND	6.8	12108	5.7	ND	1613	30.3	ND	9.4	ND	ND	ND	ND	ND	36.8	14.7
SO-49250,100140-8,10-1187	11/10/87	10344	ND	14.1	196	1.3	ND	2862	14.8	9	6.6	17504	26.5	ND	1429	233	ND	10.1	ND	ND	ND	ND	ND	38.5	12.3
SO-49475,99985-0,2-1187	11/10/87	14329	ND	23.4	184	1.2	0.8	11523	21.8	12.5	17.9	22536	17	8.8	4364	771	ND	189	904	ND	ND	ND	ND	42.6	51.5
SO-49475,99985-10,12-1187	11/10/87	12009	ND	9	64	1.1	ND	3462	14.4	ND	7.8	11338	4.9	ND	1442	57.2	ND	9.4	ND	ND	ND	ND	ND	32.3	12.3
SO-49475,99985-2,4-1187	11/10/87	13701	ND	16.6	246	1.1	0.6	18408	21.4	16.2	15.4	22158	26.5	6.9	2405	1176	ND	15.3	ND	ND	ND	ND	ND	47.8	37.5
SO-49475,99985-4,6-1187	11/10/87	11682	ND	16.8	22.3	1.1	0.7	15788	20.3	10.1	22.1	18389	126	6.8	2499	304	ND	17.5	ND	ND	ND	ND	ND	38.4	53.5
SO-49475,99985-6,8-1187	11/10/87	8271	ND	7.1	230	0.6	ND	2945	20.1	ND	11.4	5296	5.8	ND	1545	63	ND	13	ND	ND	ND	ND	ND	19.7	23.3
SO-49475,99985-8,10-1187	11/10/87	12095	ND	8.2	92.4	0.9	ND	3333	14.8	7.1	5.5	8795	8.8	ND	1435	85	ND	7.4	ND	ND	ND	ND	ND	25	13.2

TABLE B-3

Ash Pond Dike IRA Soils Results - Anions

LOCATION	DATE SAMPLED	CONCENTRATION (UG/G) CHLORIDE	FLOURIDE	NITRATE	SULFATE
SO-51100,100335-0,2-1187	11/09/87	3.71	5.95	6.76	26.76
SO-51100,100335-2,4-1187	11/09/87	4.09	1.75	10.67	79.55
SO-51100,100335-4,6-1187	11/09/87	3.93	9.27	2.29	26.67
SO-51100,100335-6,8-1187	11/09/87	4.17	7.71	1.87	23.81
SO-51100,100335-8,10-1187	11/09/87	3.37	9.22	4.42	11.5
SO-51125,100260-0,2-1187	11/09/87	4.67	1.29	1.57	21.64
SO-51125,100260-2,4-1187	11/09/87	0.99	1.5	1.35	19.47
SO-51125,100260-4,6-1187	11/09/87	4.01	5.35	1.76	17.97
SO-51125,100260-6,8-1187	11/09/87	4.97	5.52	96.47	12.29
SO-51125,100260-8,10-1187	11/09/87	4.14	10.38	5.3	7.48
SO-51150,100220-0,2-1187	11/09/87	5.71	4.82	2.20	42.09
SO-51150,100220-2,4-1187	11/09/87	2.74	4.85	5.53	26.81
SO-51150,100220-4,6-1187	11/09/87	4.16	7.29	3.99	25.66
SO-51150,100220-6,8-1187	11/09/87	4.36	8.98	2.13	25.55
SO-51150,100220-8,10-1187	11/09/87	4.44	7.62	8.86	26.05
SO-51180,100335-0,2-1187	11/09/87	2.39	8.05	1.66	123.51
SO-51180,100335-2,4-1187	11/09/87	3.51	9.08	2.89	150.93
SO-51308,100085-0,2-1187	11/09/87	5.58	4.39	4.46	17.98
SO-51308,100085-2,4-1187	11/09/87	1.55	ND	0.89	58.63
SO-51308,100085-4,6-1187	11/09/87	3.53	1.87	1.74	37.97
SO-51308,100085-6,8-1187	11/09/87	1.53	ND	3.38	97.77
SO-51308,100085-8,10-1187	11/09/87	1.48	ND	18.23	62.20

TABLE B-4

Ash Pond Dike IRA Soils Results - Metals

LOCATION	DATE SAMPLED	CONCENTRATION (UG/G)																					
		Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Ni	K	Se	Ag	Na	TL	V
SO-51100,100335-0,2-1187	11/09/87	14142	ND	21.2	284	1	1.5	3945	20.6	15.6	14.3	20464	19.6	7.5	2290	1546	ND	17.3	805	ND	1.27	ND	ND	42.7
SO-51100,100335-2,4-1187	11/09/87	12294	ND	7.6	192	0.7	0.7	2260	18.4	12.3	11.9	18181	18.1	7.3	2090	860	ND	15.8	600	ND	ND	ND	ND	37.1
SO-51100,100335-4,6-1187	11/09/87	21184	ND	5	162	1.2	0.9	3281	24.5	36	9.8	20037	18.2	9.2	2473	865	ND	14.3	ND	ND	ND	ND	ND	42.7
SO-51100,100335-6,8-1187	11/09/87	12164	ND	8	105	0.9	0.8	3311	15.7	ND	8.3	16991	12.7	ND	1850	110	ND	8.1	ND	ND	ND	ND	ND	40.1
SO-51100,100335-8,10-1187	11/09/87	15849	ND	10.6	206	3	0.8	5261	21.2	17.4	20.6	32122	16.4	18.1	2829	933	ND	67.2	ND	ND	ND	ND	ND	49.7
SO-51125,100260-0,2-1187	11/09/87	12164	ND	21.1	175	0.9	0.8	1655	17.8	18.2	11.2	19474	20.4	6.9	1860	1345	ND	17.3	641	ND	ND	ND	ND	41.9
SO-51125,100260-2,4-1187	11/09/87	11004	ND	18.7	120	0.8	ND	1579	18.6	6.9	8.9	16868	6.3	ND	1454	497	ND	11.5	ND	ND	ND	ND	ND	36.2
SO-51125,100260-4,6-1187	11/09/87	25244	ND	11.8	103	1.1	0.8	5337	27.2	ND	13	26286	5.2	8	3128	55	ND	24.4	ND	ND	ND	ND	ND	48.7
SO-51125,100260-6,8-1187	11/09/87	19761	ND	20.9	1.6	0.8	5222	25	7.8	15.4	30548	20.9	ND	2769	161	ND	35.9	ND	ND	ND	ND	ND	ND	49.7
SO-51125,100260-8,10-1187	11/09/87	12591	ND	22.2	108	2.8	0.7	3321	19	8.3	19.2	20113	7.9	ND	2061	352	ND	41.9	ND	ND	ND	ND	ND	39.8
SO-51150,100220-0,2-1187	11/09/87	12019	ND	10.8	208	1	ND	2501	17.1	9.5	12.4	18219	12.2	ND	2175	633	ND	14.2	ND	ND	ND	ND	ND	40
SO-51150,100220-2,4-1187	11/09/87	12678	ND	5.6	85	0.7	ND	3063	23.7	ND	6.5	19623	4	ND	1588	53.5	ND	9.6	ND	ND	ND	ND	ND	40.5
SO-51150,100220-4,6-1187	11/09/87	19028	ND	25.5	81	0.9	ND	3356	31	ND	8.5	22677	4.7	2059	48	ND	15	ND	ND	ND	ND	ND	44.6	48.9
SO-51150,100220-6,8-1187	11/09/87	13236	ND	25.7	66	ND	ND	2970	16.5	ND	8.7	17780	6.66	1623	37	ND	17	ND	ND	ND	ND	ND	27.4	55.8
SO-51150,100220-8,10-1187	11/09/87	11947	ND	19.8	69	0.9	ND	2996	15	ND	12.4	17502	11.4	ND	1687	78.1	ND	19.5	ND	ND	ND	ND	ND	29.4
SO-51180,100335-0,2-1187	11/09/87	13859	ND	7.2	188	1	0.6	2642	20	10.8	13.4	18111	8.2	11.7	2627	342	ND	19.8	711	ND	ND	ND	ND	36.8
SO-51180,100335-2,4-1187	11/09/87	11957	ND	4.6	239	1	0.6	2363	19.5	10	12.7	16776	8.5	8.5	2437	440	ND	14.2	ND	ND	ND	ND	ND	34.5
SO-51308,100085-0,2-1187	11/09/87	11767	ND	8.65	131	0.7	0.6	3350	15.9	ND	9.8	13542	14	ND	1317	340	ND	9.2	ND	ND	ND	ND	ND	31.9
SO-51308,100085-2,4-1187	11/09/87	8343	ND	5.8	31	0.7	ND	1073	9.7	ND	9.1	5198	8.7	ND	615	138	ND	5.6	ND	ND	ND	ND	ND	13.4
SO-51308,100085-4,6-1187	11/09/87	11246	ND	9.01	84	1.2	0.6	2844	15.9	12.3	8.9	9690	9.7	ND	1448	579	ND	9.7	ND	ND	ND	ND	ND	23.9
SO-51308,100085-6,8-1187	11/09/87	13261	ND	13.4	48	1.3	0.6	1266	17.8	13	9.3	22249	11.7	ND	1015	283	ND	8.4	ND	ND	ND	ND	ND	44.6
SO-51308,100085-8,10-1187	11/09/87	11840	ND	11.53	39	0.7	ND	ND	13.4	12.4	5.9	17159	8.6	ND	711	220	ND	5.8	ND	ND	ND	ND	ND	29.9

TABLE B-5

Material Staging Area IRA Soils Results - Anions

Location	Date Sampled	Concentration (UG/G)			
		Chloride	Flouride	Nitrate	Sulfate
SO-51137,101068-0,2-1187	11/06/87	ND	2.79	0.85	15.31
SO-51137,101068-10,12-1187	11/06/87	ND	9.49	2.43	17.89
SO-51137,101068-2,4-1187	11/06/87	ND	7.92	0.79	82
SO-51137,101068-4,6-1187	11/06/87	ND	6.34	1.27	46.92
SO-51137,101068-6,8-1187	11/06/87	ND	8.11	1.33	38.49
SO-51137,101068-8,10-1187	11/06/87	3.42	7.94	1.83	29.33
SO-51150,101207-0,2-1187	11/06/87	ND	2.1	1.46	15.72
SO-51150,101207-2,4-1187	11/06/87	ND	6.69	0.89	148.32
SO-51150,101207-4,6-1187	11/06/87	5.13	5.13	0.89	90.26
SO-51150,101207-6,8-1187	11/06/87	ND	7.97	1.57	24.83
SO-51150,101207-8,10-1187	11/06/87	ND	8.83	1.39	17.65
SO-51360,101175-0,2-1187	11/06/87	ND	3.42	0.94	97.85
SO-51360,101175-2,4-1187	11/06/87	ND	8.56	0.79	78.29
SO-51360,101175-4,6-1187	11/06/87	ND	4.96	0.69	79.35
SO-51360,101175-6,8-1187	11/06/87	5.43	4.72	1.18	52.31
SO-51360,101175-8,10-1187	11/06/87	ND	5.45	1.95	43.51
SO-51445,101065-0,2-1187	11/06/87	ND	4.68	2.22	18.5
SO-51445,101065-10,12-1187	11/06/87	1.25	4.53	ND	8.39
SO-51445,101065-2,4-1187	11/06/87	5.04	12.65	1.68	124.26
SO-51445,101065-4,6-1187	11/06/87	5.7	9.72	1.45	144.05
SO-51445,101065-6,8-1187	11/06/87	5.51	6.72	1.32	52.88
SO-51445,101065-8,10-1187	11/06/87	4.21	6.72	1.82	9.34
SO-51500,101190-0,2-1187	11/06/87	2.04	ND	42.18	1.32
SO-51500,101190-10,12-1187	11/06/87	1.17	5.16	ND	11.37
SO-51500,101190-12,14-1187	11/06/87	1.27	5.54	ND	22.17
SO-51500,101190-2,4-1187	11/06/87	4.36	6.94	1.79	53.59
SO-51500,101190-4,6-1187	11/06/87	7.40	5.55	1.63	164.24
SO-51500,101190-6,8-1187	11/06/87	5.59	3.46	1.56	33.96
SO-51500,101190-8,10-1187	11/06/87	1.43	2.51	ND	26.31

TABLE B-6

Material Staging Area IRA Soils Results - Metals

	DATE SAMPLED	CONCENTRATION (UG/G) LOCATION																						
		Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Ni	K	Se	Ag	Na	Tl	V
SO-51137,101068-0,2-1187	11/06/87	20301	ND	7	223	1.2	1.2	2358	35.7	14.2	24	25634	33.5	10.9	3389	648	ND	23.6	1670	ND	2.6	ND	ND	52.3
SO-51137,101068-10,12-1187	11/06/87	13703	ND	7.8	128	1.2	0.9	3018	35.1	8.2	13.5	16587	28.3	ND	1953	107	ND	14.9	821	ND	2.4	ND	ND	46
SO-51137,101068-2,4-1187	11/06/87	10628	ND	7.3	211	0.9	1	1922	27.3	9	14.5	14964	19.6	9.8	2658	402	ND	23.4	1064	ND	2.4	565	ND	31.7
SO-51137,101068-4,6-1187	11/06/87	10744	ND	8.8	161	0.8	ND	1754	21.9	9	6.1	14179	4.1	9	1893	709	ND	12.8	ND	ND	ND	ND	ND	33.2
SO-51137,101068-6,8-1187	11/06/87	16872	ND	8.3	132	0.7	1	2733	24.4	17.9	11.6	17925	23.3	7.2	2161	366	ND	12.4	724	ND	2	ND	ND	35.8
SO-51137,101068-8,10-1187	11/06/87	15607	ND	6.9	359	1	1	2538	19	6.4	13.3	14984	23.1	ND	2102	45.2	ND	12.8	947	ND	2	ND	ND	23.4
SO-51150,101207-0,2-1187	11/06/87	16688	ND	19	147	1.1	1	2295	22.7	14.1	22.8	24443	24.3	9.6	2923	505	ND	20.2	1062	ND	2	582	ND	44.4
SO-51150,101207-2,4-1187	11/06/87	13415	ND	6.7	386	1	1.2	2498	24.3	12	21	20475	18.4	11	3735	653	ND	27.6	1288	ND	1.6	ND	ND	38.5
SO-51150,101207-4,6-1187	11/06/87	7839	ND	4	189	0.8	1	1699	15.6	14.2	14	13672	17.2	7.8	2072	583	ND	14.3	ND	ND	1.5	ND	ND	29.7
SO-51150,101207-6,8-1187	11/06/87	15277	ND	4.7	234	1.3	1.3	2090	25.2	27.1	16	22869	33.7	10.8	2273	1522	ND	18.1	ND	ND	2.2	ND	ND	48.6
SO-51150,101207-8,10-1187	11/06/87	14561	ND	4.2	118	1	0.8	2660	25	9.4	12.8	22327	29.8	ND	1904	379	ND	11	630	ND	1.8	ND	ND	47
SO-51360,101175-0,2-1187	11/06/87	20160	ND	10.1	179	0.9	1.1	11931	27.5	10.8	22	24463	25.4	10	4149	551	ND	18	1398	ND	3	ND	ND	46.8
SO-51360,101175-2,4-1187	11/06/87	13833	ND	8.8	210	1.2	1	15827	13.8	17.4	21.9	20434	26.7	8.9	4861	881	ND	25.3	1447	ND	2.7	ND	ND	42.4
SO-51360,101175-4,6-1187	11/06/87	8777	ND	8.5	194	0.7	1	1695	17.6	8.5	11.3	12629	21.5	7.9	2053	379	ND	15.2	798	ND	2	ND	ND	28
SO-51360,101175-6,8-1187	11/06/87	15031	ND	6.7	136.9	0.8	0.7	1918	20.8	19.9	9.8	15728	14.4	12.3	1877	643	ND	10.4	ND	ND	1.5	ND	ND	36.5
SO-51360,101175-8,10-1187	11/06/87	23935	ND	9.3	104	0.9	ND	3428	26.7	ND	13.7	21584	6.1	11	2519	54.3	ND	12	ND	ND	ND	ND	ND	43.6
SO-51445,101065-0,2-1187	11/06/87	13793	ND	12.1	192	0.9	0.6	5913	21.5	9.2	19.2	18700	17.1	9.9	3337	483	ND	19.8	1030	ND	ND	ND	ND	34.4
SO-51445,101065-10,12-1187	11/06/87	10521	ND	8.1	88.3	0.7	ND	1926	17	6.2	7.6	8521	14.4	ND	1291	598	ND	14.8	759	ND	ND	ND	ND	21.4
SO-51445,101065-2,4-1187	11/06/87	12784	ND	9.6	286	1.1	0.9	2563	24.8	11.2	20.5	23027	18.6	10.4	3274	886	ND	31.6	1410	ND	1.3	ND	ND	39.9
SO-51445,101065-4,6-1187	11/06/87	11546	ND	5.9	207	1.1	0.7	2255	21.2	8.8	14.7	19285	19.8	10.16	2434	402	ND	17.6	1099	ND	1.3	ND	ND	42.4
SO-51445,101065-6,8-1187	11/06/87	8669	ND	7.1	95.3	0.9	ND	1426	16.9	9.1	9.4	15741	18.7	5.9	1332	239	ND	10	603	ND	ND	ND	ND	31.4
SO-51445,101065-8,10-1187	11/06/87	9315	ND	6.8	103	1	ND	1480	26.5	15.5	9.9	17139	22.6	ND	1087	684	ND	12.1	625	ND	ND	ND	ND	40.3
SO-51500,101190-0,2-1187	11/06/87	15518	ND	29.4	159	1	0.7	3176	24.9	13.7	15.6	22265	28.3	8.9	2271	901	ND	14.9	1360	1.3	ND	ND	48.4	39.8
SO-51500,101190-10,12-1187	11/06/87	15103	ND	4.33	57	1.2	0.7	ND	20.5	9.0	11.0	14740	27	7.4	1905	68.9	ND	15.4	139.5	ND	2.7	ND	ND	33.9
SO-51500,101190-12,14-1187	11/06/87	10629	ND	9.6	259	2.0	1.0	2258	23.6	49.2	31.8	16617	36.5	6.2	1848	1005	ND	37.3	1478	ND	3.2	ND	ND	34.8
SO-51500,101190-2,4-1187	11/06/87	13145	ND	6.73	237	1.1	0.7	1823	23	14.8	18.3	19913	21.9	8.8	2987	852	ND	22.6	1488	ND	1.2	ND	ND	41.6
SO-51500,101190-4,6-1187	11/06/87	7842	ND	7.1	116	0.9	ND	1408	17.8	8.3	10.4	11551	20.0	7.0	1746	245	ND	13.5	1039	ND	1.5	ND	ND	27.6
SO-51500,101190-6,8-1187	11/06/87	11182	ND	4.83	117	0.9	0.7	1586	19.5	15.9	8.8	15449	27.7	7.9	1614	656	ND	12.3	1005	ND	1.8	ND	ND	38.1
SO-51500,101190-8,10-1187	11/06/87	26211	ND	6.21	92	1.1	ND	2607	32.2	7.3	11.8	19957	22.2	12.0	2547	140	ND	13.2	1375	ND	2.4	ND	ND	48.1

TABLE B-7

SOUTH EAST ISOLATION DIKE IRA SOILS RESULTS - ANIONS

LOCATION	DATE SAMPLED	CONCENTRATION (UG/G)			
		CHLORIDE	FLOURIDE	NITRATE	SULFATE
SO-50140,98820-0,2-1187	11/10/87	4.64	13.98	1.68	61.51
SO-50140,98820-2,4-1187	11/10/87	4.85	17.75	2.05	51.2
SO-50140,98820-4,6-1187	11/10/87	4.55	18.91	1.86	22.39
SO-50140,98820-6,8-1187	11/10/87	5.69	14.82	1.8	20.3
SO-50160,98735-0,2-1187	11/10/87	2.86	4.47	1.74	93.3
SO-50160,98735-10,12-1187	11/10/87	4.36	1.33	1.44	20.9
SO-50160,98735-2,4-1187	11/10/87	3.52	3.34	1.44	23.1
SO-50160,98735-4,6-1187	11/10/87	1.33	ND	24.5	ND
SO-50160,98735-6,8-1187	11/10/87	1.19	1.29	0.63	32.5
SO-50160,98735-8,10-1187	11/10/87	0.945	1.84	0.73	26.1
SO-50230,98991-0,2-1187	11/10/87	5.36	5.14	3.15	13.82
SO-50230,98991-2,4-1187	11/10/87	3.33	13.42	1.56	113.97
SO-50230,98991-4,6-1187	11/10/87	3.57	12.67	1.89	26.74
SO-50230,98991-6,8-1187	11/10/87	3	12.24	2.4	20.56
SO-50252,98800-0,2-1187	11/10/87	3.74	9.51	3.03	26.89
SO-50252,98800-2,4-1187	11/10/87	4.27	1.51	2.71	68.49
SO-50252,98800-4,6-1187	11/10/87	2.62	1.67	1.4	93.04
SO-50252,98800-6,8-1187	11/10/87	5.92	4.59	2.21	15.45
SO-50290,98700-0,2-1187	11/09/87	4.77	5.85	1.99	87.23
SO-50290,98700-2,4-1187	11/09/87	4.6	6.67	2.25	514.76
SO-50290,98700-4,6-1187	11/09/87	4.82	8.38	1.65	263.77
SO-50290,98700-6,8-1187	11/09/87	5.19	7.81	6.71	11297

TABLE B-8

SOUTH EAST ISOLATION DIKE IRA SOILS RESULTS - METALS

LOCATION	DATE SAMPLED	Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Ni	K	Se	Ag	Na	Tl
		Concentration (UG/G)																					
SO-50140,98820-0,2-1187	11/10/87	9338	ND	6.4	95	1.2	1.4	46097	17.8	7.3	10.6	10384	18	ND	11575	304	ND	10.2	ND	ND	2.1	ND	ND
SO-50140,98820-2,4-1187	11/10/87	14568	ND	5	88.7	1.5	0.8	3816	23.2	8.5	17.2	23129	11.7	ND	2622	107	ND	25.8	ND	ND	ND	ND	ND
SO-50140,98820-4,6-1187	11/10/87	8168	ND	8.3	314	1.7	0.9	3179	12.3	23.6	14.9	12496	13.2	ND	1897	1218	ND	39.3	ND	ND	ND	ND	ND
SO-50140,98820-6,8-1187	11/10/87	10762	ND	4.3	139	2.9	0.8	3383	20.5	7.8	23	20415	6.4	5.9	2187	455	ND	36.9	ND	ND	ND	ND	ND
SO-50160,98735-0,2-1187	11/10/87	10702	ND	5.8	142	0.9	1.1	26698	19.7	12	26	17113	24.4	5.8	3251	8590	ND	15.8	ND	ND	1.3	ND	ND
SO-50160,98735-10,12-1187	11/10/87	10590	ND	6.7	95	0.9	ND	3153	19.2	6.4	13.1	16781	13.9	ND	1425	163	ND	12.3	ND	ND	ND	ND	ND
SO-50160,98735-2,4-1187	11/10/87	6765	7.4	6.2	186	1	0.9	3788	20.5	18.9	8.9	23558	27.1	ND	1950	3126	ND	13.7	ND	ND	1.4	ND	ND
SO-50160,98735-4,6-1187	11/10/87	9052	ND	7.5	129	0.8	0.8	1734	19.7	23.3	17	15067	22.8	ND	1786	2026	ND	16.5	ND	ND	ND	ND	ND
SO-50160,98735-6,8-1187	11/10/87	6951	ND	3.6	108	0.7	ND	823	15	7.8	21	10602	11.5	ND	770	295	ND	10.1	ND	ND	ND	ND	ND
SO-50160,98735-8,10-1187	11/10/87	8105	7.8	7.2	366	1	0.9	1300	26.2	25.7	7.5	22596	25.1	813	3251	ND	13	ND	ND	1.6	ND	ND	62.4
SO-50230,98991-0,2-1187	11/10/87	20315	ND	9.9	168	1.2	1	2156	24.3	6.6	20.5	24543	9.3	9.7	2075	292	ND	19.7	912	ND	ND	ND	ND
SO-50230,98991-2,4-1187	11/10/87	13120	ND	4.2	262	0.9	0.7	2140	21.1	8.2	35.1	17841	8.6	8.8	2650	555	ND	19.1	619	ND	ND	ND	ND
SO-50230,98991-4,6-1187	11/10/87	10245	ND	5.9	171.2	0.8	ND	1900	16.4	5.9	19.6	12902	8.1	7.6	1872	259	ND	10.6	ND	ND	ND	ND	ND
SO-50230,98991-6,8-1187	11/10/87	12409	ND	4.2	202	0.9	0.6	2727	16.4	10.2	26	15179	22.3	6.4	1884	470	ND	8.6	ND	ND	ND	ND	ND
SO-50252,98800-0,2-1187	11/10/87	9191	ND	6.7	159	0.9	ND	6513	17.3	13.9	11.3	16542	21.1	ND	1973	834	ND	16.2	ND	ND	ND	ND	ND
SO-50252,98800-2,4-1187	11/10/87	7166	ND	4.5	121	0.8	ND	1342	14.1	10.4	5.9	12996	18.6	ND	902	626	ND	6.7	ND	ND	ND	ND	ND
SO-50252,98800-4,6-1187	11/10/87	8037	ND	6.4	101	0.9	0.6	2423	19.1	ND	10.6	19895	12	ND	1492	117	ND	8.6	ND	ND	ND	ND	ND
SO-50252,98800-6,8-1187	11/10/87	16496	ND	7.6	98	0.8	ND	3210	13.5	21	11.5	16085	20	ND	15.4	396	ND	15.6	ND	ND	ND	ND	ND
SO-50290,98700-0,2-1187	11/09/87	12552	ND	5.4	139	0.9	ND	6425	15.5	10.8	10.2	14305	16.6	5.7	2132	299	ND	12.4	ND	ND	ND	ND	ND
SO-50290,98700-2,4-1187	11/09/87	9293	ND	6.3	183.6	0.9	0.9	18518	18	9.6	14.3	15893	16.7	6.8	5114	455	ND	16.4	600	ND	1.1	ND	ND
SO-50290,98700-4,6-1187	11/09/87	8866	ND	7.2	98.9	1.2	0.6	4158	14.5	9	14	18989	20.5	ND	2088	426	ND	25	ND	ND	ND	ND	ND
SO-50290,98700-6,8-1187	11/09/87	10355	ND	8.96	96.7	1	ND	5508	15.5	9.3	10.9	14272	8.2	ND	2124	240	ND	18.2	ND	ND	ND	ND	ND

TABLE B-9
CONSTRUCTION STAGING AREA IRA SOILS RESULTS - ANIONS

LOCATION	DATE	CONCENTRATION (UG/G)			
		CHLORIDE	FLOURIDE	NITRATE	SULFATE
SO-50800,98150-0,7-0288	02/09/88	15	10	1.5	75
SO-50800,98150-8,15-0288	02/09/88	10	15	10	10
SO-50950,98300-0,7-0288	02/09/88	30	10	5	75
SO-50950,98300-8,15-0288	02/09/88	10	10	2.0	10

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TABLE B-10
CONSTRUCTION STAGING AREA IRA SOILS RESULTS - METALS

LOCATION	DATE SAMPLED	CONCENTRATION (ug/L)																							
		Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Ni	K	Se	Ag	Na	Tl	V	Zn
SO-50800,98150-0,7-0288	02/09/88	8715	ND	14.0	125	0.80	ND	3750	12.9	10.5	8.45	12880	14.3	ND	1981	720	ND	13.2	427	2.93	ND	121	ND	24.6	26.6
SO-50950,98300-0,7-0288	02/09/88	10010	ND	12.71	141	0.79	0.65	2210	15.6	5.97	11.8	16160	11.1	ND	2040	219	ND	12.0	385	1.09	ND	335	ND	29.2	28.1

APPENDIX C
ANALYTICAL DETECTION LIMITS

ANALYTICAL PARAMETER	UNITS	DETECTION LIMITS	CATEGORY
Aluminum	ug/g	20	Metals
Antimony	ug/g	6	Metals
Arsenic	ug/g	1	Metals
Barium	ug/g	20	Metals
Beryllium	ug/g	0.5	Metals
Cadmium	ug/g	0.5	Metals
Calcium	ug/g	500	Metals
Chromium	ug/g	1	Metals
Cobalt	ug/g	5	Metals
Copper	ug/g	2.5	Metals
Iron	ug/g	10	Metals
Lead	ug/g	0.5	Metals
Lithium	ug/g	5	Metals
Magnesium	ug/g	500	Metals
Manganese	ug/g	1.5	Metals
Mercury	ug/g	0.1	Metals
Nickel	ug/g	4	Metals
Potassium	ug/g	500	Metals
Selenium	ug/g	0.5	Metals
Silver	ug/g	1	Metals
Sodium	ug/g	500	Metals
Thallium	ug/g	1	Metals
Vanadium	ug/g	5	Metals
Zinc	ug/g	2	Metals
Nitrate	ug/g	0.5	Ions
Sulfate	ug/g	1	Ions
Chloride	ug/g	1.25	Ions
Fluoride	ug/g	1.25	Ions
2,4,6-TNT	ug/g	1.2	Nitroaromatics
2,4 DNT	ug/g	0.75	Nitroaromatics
2,6 DNT	ug/g	1.41	Nitroaromatics
Nitrobenzene	ug/g	1.44	Nitroaromatics
1,3,5-Trinitrobenzene	ug/g	0.57	Nitroaromatics
1,3-Dinitrobenzene	ug/g	0.9	Nitroaromatics
Percent Moisture	prcnt	-	Misc.
pH	units	-	Misc.
Phenol	ug/kg	330	Semi-volatiles
bis(2-Chlorethyl) ether	ug/kg	330	Semi-volatiles
2-Chlorophenol	ug/kg	330	Semi-volatiles
1,3-Dichlorobenzene	ug/kg	330	Semi-volatiles
1,4-Dichlorobenzene	ug/kg	330	Semi-volatiles
Benzyl Alcohol	ug/kg	330	Semi-volatiles
1,2-Dichlorobenzene	ug/kg	330	Semi-volatiles
2-Methylphenol	ug/kg	330	Semi-volatiles
bis(2-Chloroisopropyl) ether	ug/kg	330	Semi-volatiles
4-Methylphenol	ug/kg	330	Semi-volatiles

ANALYTICAL PARAMETER	UNITS	DETECTION LIMITS	CATEGORY
N-Nitro-Dipropylamine	ug/kg	330	Semi-volatiles
Hexachloroethane	ug/kg	330	Semi-volatiles
Nitrobenzene	ug/kg	330	Semi-volatiles
Isophorone	ug/kg	330	Semi-volatiles
2-Nitrophenol	ug/kg	1600	Semi-volatiles
2,4-Dimethyphenol	ug/kg	330	Semi-volatiles
Benzoic Acid	ug/kg	1600	Semi-volatiles
bis(2-Chloroethoxy) methane	ug/kg	330	Semi-volatiles
2,4-Dichlorophenol	ug/kg	330	Semi-volatiles
1,2,4-trichlorobenzene	ug/kg	330	Semi-volatiles
Naphthalene	ug/kg	330	Semi-volatiles
4-Chloroaniline	ug/kg	330	Semi-volatiles
Hexachlorobutadiene	ug/kg	330	Semi-volatiles
4-Chloro-3-methylphenol	ug/kg	330	Semi-volatiles
2-Methylnaphthalene	ug/kg	330	Semi-volatiles
Hexachlorocyclopentadiene	ug/kg	330	Semi-volatiles
2,4,6-Trichlorophenol	ug/kg	330	Semi-volatiles
2,4,5-Trichlorophenol	ug/kg	1600	Semi-volatiles
2-Chloronaphthalene	ug/kg	330	Semi-volatiles
2-Nitroaniline	ug/kg	1600	Semi-volatiles
Dimethyl Phthalate	ug/kg	330	Semi-volatiles
Acenaphthylene	ug/kg	330	Semi-volatiles
2,6-Dinitrotoluene	ug/kg	330	Semi-volatiles
3-Nitroaniline	ug/kg	1600	Semi-volatiles
Acenaphthene	ug/kg	330	Semi-volatiles
2,4-Dinitrophenol	ug/kg	1600	Semi-volatiles
4-Nitrophenol	ug/kg	1600	Semi-volatiles
Dibenzofuran	ug/kg	330	Semi-volatiles
2,4-Dinitrotoluene	ug/kg	330	Semi-volatiles
Diethylphthalate	ug/kg	330	Semi-volatiles
4-Chlorophenyl Phenyl Ether	ug/kg	330	Semi-volatiles
Fluorene	ug/kg	330	Semi-volatiles
4-Nitroaniline	ug/kg	1600	Semi-volatiles
4,6-Dinitro-2-methylphenol	ug/kg	1600	Semi-volatiles
N-nitrosodiphenylamine	ug/kg	330	Semi-volatiles
4-Bromophenyl Phenyl Ether	ug/kg	330	Semi-volatiles
Hexachlorobenzene	ug/kg	330	Semi-volatiles
Pentachlorophenol	ug/kg	1600	Semi-volatiles
Phenanthrene	ug/kg	330	Semi-volatiles
Anthracene	ug/kg	330	Semi-volatiles
Di-n-butylphthalate	ug/kg	330	Semi-volatiles
Fluoranthene	ug/kg	330	Semi-volatiles
Pyrene	ug/kg	330	Semi-volatiles
Butyl Benzyl Phthalate	ug/kg	330	Semi-volatiles
3,3'-Dichlorobenzidine	ug/kg	660	Semi-volatiles
Benzo(a)anthracene	ug/kg	330	Semi-volatiles
Chrysene	ug/kg	330	Semi-volatiles
bis(2-ethylhexyl)phthalate	ug/kg	330	Semi-volatiles
Di-n-octyl Phthalate	ug/kg	330	Semi-volatiles
Benzo(b)fluoranthene	ug/kg	330	Semi-volatiles

ANALYTICAL PARAMETER	UNITS	DETECTION LIMITS	CATEGORY
Benzo(k)fluoranthene	ug/kg	330	Semi-volatiles
Benzo(a)pyrene	ug/kg	330	Semi-volatiles
Indeno(1,2,3-cd)pyrene	ug/kg	330	Semi-volatiles
Dibenzo(a,h)anthracene	ug/kg	330	Semi-volatiles
Benzo(g,h,i)perylene	ug/kg	330	Semi-volatiles
alpha-BHC	ug/kg	8	Pesticide/PCBs
beta-BHC	ug/kg	8	Pesticide/PCBs
delta-BHC	ug/kg	8	Pesticide/PCBs
gamma-BHC (Lindance)	ug/kg	8	Pesticide/PCBs
Heptachlor	ug/kg	8	Pesticide/PCBs
Aldrin	ug/kg	8	Pesticide/PCBs
Heptachlor Epoxide	ug/kg	8	Pesticide/PCBs
Endosulfan I	ug/kg	8	Pesticide/PCBs
Dieldrin	ug/kg	16	Pesticide/PCBs
4,4'-DOE	ug/kg	16	Pesticide/PCBs
Endrin	ug/kg	16	Pesticide/PCBs
Endosulfan II	ug/kg	16	Pesticide/PCBs
4,4'-DOD	ug/kg	16	Pesticide/PCBs
Endosulfan Sulfate	ug/kg	16	Pesticide/PCBs
4,4'-DOT	ug/kg	16	Pesticide/PCBs
Endrin Ketone	ug/kg	16	Pesticide/PCBs
Methxychlor	ug/kg	80	Pesticide/PCBs
alpha-chlordane	ug/kg	80	Pesticide/PCBs
gamma-chlordane	ug/kg	80	Pesticide/PCBs
Toxaphene	ug/kg	160	Pesticide/PCBs
Aroclor-1016	ug/kg	80	Pesticide/PCBs
Aroclor-1221	ug/kg	80	Pesticide/PCBs
Aroclor-1232	ug/kg	80	Pesticide/PCBs
Aroclor-1242	ug/kg	80	Pesticide/PCBs
Aroclor-1248	ug/kg	80	Pesticide/PCBs
Aroclor-1254	ug/kg	160	Pesticide/PCBs
Aroclor-1260	ug/kg	160	Pesticide/PCBs

APPENDIX D
ANALYTICAL QUALITY CONTROL DATA SUMMARY

WELDDATA/TXTJOANN

WELDON SPRING SITE REMEMDIAL ACTION PROJECT

Quality Control Report

metaTRACE, Inc. ■ 13715 Rider Trail North ■ Earth City, MO 63045 ■ (314) 298-8566

CLIENT: MK Ferguson
PROJECT #'s: 100-02 And 100-03
SAMPLE #'s: AA05276 - AA05649 (All Soil samples)

GC/MS ANALYSIS CONFORMANCE SUMMARY

1) GC/MS TUNE SPECIFICATIONS ☒

 a) BFB PASSED ☒
 b) DFTPP PASSED

2) GC/MS TUNING FREQUENCY - PERFORMED PER METHOD EPA-CLP ☒

3) GC/MS CALIBRATION - INITIAL CALIBRATION CURVE OR CALIBRATION CHECK STANDARD RUN PER METHOD EPA - CLP ☒

4) GC/MS CALIBRATION REQUIREMENTS MET ☒

 a) CALIBRATION CHECK COMPOUNDS ☒
 b) SYSTEM PERFORMANCE CHECK COMPOUNDS

5) BLANK CONTAMINATION - COMPOUNDS LISTED

 a) VOA FRACTION metylene chloride 2.5 ug/l
 b) B/N FRACTION no contaminates
 c) A/E FRACTION no contaminates

6) SURROGATE RECOVERIES MEET CRITERIA (IF NOT MET, REFER TO INDIVIDUAL SURROGATE RECOVERY FORMS FOR ACTUAL RECOVERIES) ☒

 a) VOA FRACTION All surrogates within limits
 b) B/N FRACTION AA05276(2), AA5307(2), AA05553(2), AA05646(2)
 c) A/E FRACTION AA05276(2), AA5307(2), AA05553(1), AA05646(2)

7) SPIKED BLANK WITHIN CONTROL LIMITS Not Applicable ☐

8) SAMPLE HOLDING TIMES MET All holding times were met ☒

9) MINIMUM DETECTION LIMITS ON ALL FRACTIONS AT OR BELOW METHOD SPECIFICATIONS. (IF NOT CHECKED REFER TO INDIVIDUAL ANALYSIS REPORTS FOR THE ACTUAL MDL'S) ☒

10) ALL SAMPLES CONFORM TO EPA CLP QA/QC CRITERIA UNLESS OTHERWISE DENOTED BELOW. ☒

ADDITIONAL COMMENTS:

Richard H. Maurer [signature]
PROJECT MANAGER

metaTRACE, Inc. ▪ 13715 Rider Trail North ▪ Earth City, MO 63045 ▪ (314) 298-8566

CLIENT: M K Ferguson
PROJECT #'s: 100-02 and 100-03 (All Soil Samples)
SAMPLE #'s: AA05271 - AA05649

GC/HPLC ANALYSIS CONFORMANCE SUMMARY

1) GC/HPLC CALIBRATION - INITIAL CALIBRATION CURVE OR/CALIBRATION CHECK STANDARD RUN PER METHOD GC - EPA CLP / HPLC - USATHAMA ☒

2) BLANK CONTAMINATION - COMPOUNDS LISTED

a) GC no contaminates

b) HPLC no contaminates

3) SPIKED BLANK WITHIN CONTROL LIMITS ☒

4) SAMPLE HOLDING TIMES MET All holding times met ☒

5) MINIMUM DETECTION LIMITS ON GC/HPLC METHODS AT OR BELOW METHOD SPECIFICATIONS ☒

6) ALL SAMPLES CONFORM TO EPA - CLP QA/QC CRITERIA UNLESS OTHERWISE DENOTED BELOW ☒

ADDITIONAL COMMENTS:

Richard H Manny
PROJECT MANAGER

metaTRACE, Inc. ■ 13715 Rider Trail North ■ Earth City, MO 63045 ■ (314) 298-8566

CLIENT: MK Ferguson
PROJECT #'s: 100-02 100-03
SAMPLE #'s: AA05271 - AA05649 (Soil)

METALS/INORGANIC ANALYSIS CONFORMANCE SUMMARY

1) INITIAL CALIBRATION CURVE OR CALIBRATION CHECK STANDARD RUN PER METHOD EPA - CLP ☒

2) BLANK CONTAMINATION - COMPOUNDS LISTED

a) METALS no contaminates

b) INORGANIC no contaminates

3) SPIKED BLANK (LABORATORY CONTROL SAMPLE) WITHIN CONTROL LIMITS ☒

4) SAMPLE HOLDING TIMES MET All holding times met ☒

5) MINIMUM DETECTION LIMITS ON METALS/INORGANICS AT OR BELOW METHOD SPECIFICATIONS EPA CLP ☒

6) ALL SAMPLES CONFORM TO EPA CLP QA/QC CRITERIA UNLESS OTHERWISE DENOTED BELOW ☒

ADDITIONAL COMMENTS:

Richard H Mannz
PROJECT MANAGER

metaTRACE, Inc. ■ 13715 Rider Trail North ■ Earth City, MO 63045 ■ (314) 298-8566

CLIENT: MK Ferguson
PROJECT #'s: 100-02, 100-03
SAMPLE #'s: AA06554 - 7053 Soils U-238

RADIOCHEMICAL ANALYSIS CONFORMANCE SUMMARY

1) GAS PROPORTIONAL COUNTER

- a) BACKGROUND ACCEPTABLE ALPHA ☐
- b) BACKGROUND ACCEPTABLE BETA ☐
- c) PERFORMANCE CHECK ACCEPTABLE ALPHA ☐
- d) PERFORMANCE CHECK ACCEPTABLE BETA ☐

2) ALPHA SPECTROMETER

- a) BACKGROUND ACCEPTABLE ☒
- b) CALIBRATION (KeV/CHANNEL) VERIFICATION ☒

3) ALPHA SCINTILLATION COUNTER

- a) BACKGROUND ACCEPTABLE ☐
- b) PERFORMANCE CHECK ACCEPTABLE ☐

4) METHOD SPECIFIC PARAMETERS

- a) BLANK IN CONTROL ☒
- b) SPIKED BLANK IN CONTROL ☒
- c) RPD FOR DUPLICATES IN CONTROL ☒

ADDITIONAL COMMENTS: ______________________

Richard J. Mann[?]
PROJECT MANAGER

metaTRACE, Inc. ■ 13715 Rider Trail North ■ Earth City, MO 63045 ■ (314) 298-8566

WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05283
SITE ID: SO-51360-101175-2,4-1187

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	0.7	2.14	1.5	84
CHLORIDE	<1.25	2.07	180	87
FLUORIDE	7.6	3.52	9.88	93
SULFATE	69.5	15.9	85.4	103

SAMPLE NO: AA05292
SITE ID: SO-51445-101065-10,12-1187

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	<0.5	2.5	2.36	94
CHLORIDE	1.1	2.25	3.32	102
FLUORIDE	4	2.75	6.8	98
SULFATE	7.4	3.5	10.89	115

SAMPLE NO: AA05637
SITE ID: SO-49160-100500-0,2-1187

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	1.3	2	3.21	91
CHLORIDE	3.1	2	5.04	84
FLUORIDE	8.8	3.75	12.59	103
SULFATE	40.5	10	50.5	100

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05335
SITE ID: SO-50230-98991-4,6-1187 (MS)

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	11.5	10	21.6	101
CHLORIDE	13.4	10	23.5	101
FLUORIDE	22.4	20	43.6	106
SULFATE	28.5	20	48.1	98

SAMPLE NO: AA05301
SITE ID: SO-51308-100085-2,4-1187

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	0.75	10	10.15	94
CHLORIDE	1.31	10	9.41	81
FLUORIDE	<1.25	10	9.4	94
SULFATE	49.4	25	74.4	100

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05610
SITE ID: SO-49080-100295-0,2-1187

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	2.2	2.5	4.99	115
CHLORIDE	2.8	4.55	7.35	117
FLUORIDE	5.1	3	8.2	104
SULFATE	22	8	31.9	95

SAMPLE NO: AA05300
SITE ID: SO-51308-100085-0,2-1187

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	3.82	10	12.3	89
CHLORIDE	4.78	15	9.3	63
FLUORIDE	3.76	10	13.1	95
SULFATE	15.4	10	23.4	88

SAMPLE NO: AA05328
SITE ID: SO-50140-98820-2,4-1187 (MS)

	SAMPLE CONC	ADDED AMOUNT	SPIKE	PERCENT RECOVERY
NITRATE	10.8	10	20.18	93.8
CHLORIDE	11.9	10	20.1	82
FLUORIDE	21.6	20	39.9	91.5
SULFATE	31.6	25	52.6	84

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WSSRAP PROJECT NO: 100-03
SOIL DUPLICATES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05280
SITE ID: SO-51137-101068-8,10-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	1.83	7.94	3.42	29.33
RESULT #2	1.4	6.5	2.5	26.0

SAMPLE NO: AA05294
SITE ID: SO-51500-101190-2,4-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	1.79	6.94	4.36	53.59
RESULT #2	2.3	5.2	5.9	59.2

SAMPLE NO: AA05613
SITE ID: SO-49080-100295-6,8-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	1.67	21.40	1.20	4.30
RESULT #2	1.4	18.7	0.7	3.7

SAMPLE NO: AA05623
SITE ID: SO-49101-100500-0,2-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	3.58	9.53	1.3	34.24
RESULT #2	3.5	8.8	1.2	34.1

SAMPLE NO: AA05633
SITE ID: SO-49000-100665-4,6-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	1.43	15.65	2.63	136.20
RESULT #2	1.2	13.2	2.2	114

SAMPLE NO: AA05650
SITE ID: SO-49082-100570-14,16-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	2.47	6.95	0.94	13.66
RESULT #2	1.8	8.7	0.9	12.6

SAMPLE NO: AA05309
SITE ID: SO-51150-100220-8,10-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	8.86	7.62	4.44	26.05
RESULT #2	6.29	6.66	0.94	18.9

SAMPLE NO: AA05556
SITE ID: SO-49000-100295-4,6-1187

	NITRATE	FLUORIDE	CHLORIDE	SULFATE
RESULT #1	1.40	12.10	19.39	27.73
RESULT #2	0.61	10.6	14.6	22.4

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05278
SITE ID: SO-51137-101068-4,6-1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6.0	10	<6.0	NC
ARSENIC	6.15	4	11.3	129
BARIUM	140	200	334	97
BERYLLIUM	0.71	5	5.95	104.8
CADMIUM	<0.5	5	4.96	99.2
CALCIUM	----	NA	----	----
CHROMIUM	19	20	32.8	69
COBALT	7.82	50	56.6	97.6
COPPER	5.26	25	28.9	94.6
IRON	----	NA	----	----
LEAD	<3.6	50	49.9	99.8
MAGNESIUM	----	NA	----	----
MANGANESE	615	50	680	NC
MERCURY	<0.1	1	1.23	123
NICKEL	11.1	50	58.3	94.4
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	<0.30	5	4.49	89.8
SODIUM	----	NA	----	----
THALLIUM	<0.5	5	4.3	86
VANADIUM	28.8	50	74.9	92.2
ZINC	20.4	50	65	89.2
LITHIUM	----	NA	----	----

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05327
SITE ID: SO-50140-98820-2,4-1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6.0	10	16.3	163
ARSENIC	6.56	4	10.9	87
BARIUM	65555.3	200	467	201
BERYLLIUM	1.09	5	6.92	117
CADMIUM	0.6	5	6.24	113
CALCIUM	----	NA	----	----
CHROMIUM	17	20	46.3	147
COBALT	6.2	50	76.6	141
COPPER	12.6	25	45.7	132
IRON	----	NA	----	----
LEAD	8.61	50	73.4	130
MAGNESIUM	----	NA	----	----
MANGANESE	77.8	50	257	358
MERCURY	<0.1	1	0.93	93
NICKEL	18.9	50	86.6	135
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	0.76	5	6.22	109
SODIUM	----	NA	----	----
THALLIUM	<0.5	5	4.4	88
VANADIUM	28.5	50	111	165
ZINC	28.3	50	85.2	114
LITHIUM	----	NA	----	----

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05334
SITE ID: SO-50230-98991-4,6-1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6	10	14	140
ARSENIC	5	4	9.02	101
BARIUM	146	200	355	104.5
BERYLLIUM	0.71	5	5.98	105.4
CADMIUM	<0.5	5	5.58	111.6
CALCIUM	----	NA	----	----
CHROMIUM	14	20	36.8	114
COBALT	<5	50	54.9	109.8
COPPER	16.7	25	29.1	49.6
IRON	----	NA	----	----
LEAD	6.93	50	53.2	92.5
MAGNESIUM	----	NA	----	----
MANGANESE	221	50	397	NC
MERCURY	<0.1	1	0.76	76
NICKEL	9	50	55.8	93.6
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	0.37	5	4.91	98.2
SODIUM	----	NA	----	----
THALLIUM	<0.5	5	4.2	84
VANADIUM	24.8	50	80.9	112
ZINC	24.9	50	66.1	82.4
LITHIUM	----	NA	----	----

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05566
SITE ID: SO-49475-99985-0,2-1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6.0	10	15.12	151
ARSENIC	14.13	4	17.6	87
BARIUM	152	200	340	94
BERYLLIUM	0.98	5	6.23	105
CADMIUM	0.69	5	5.46	95.4
CALCIUM	----	NA	----	----
CHROMIUM	18	20	36.4	92
COBALT	10.3	50	56.2	91.8
COPPER	14.8	25	39.2	97.6
IRON	----	NA	----	----
LEAD	14	50	65.5	103
MAGNESIUM	----	NA	----	----
MANGANESE	636	50	638	NC
MERCURY	<0.2	1	1.12	112
NICKEL	15.6	50	60.7	90.2
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	<1.0	5	4.61	92.2
SODIUM	----	NA	----	----
THALLIUM	0.5	5	5.4	108
VANADIUM	35.1	50	82.3	94.4
ZINC	42.5	50	87.9	90.8
LITHIUM	----	NA	----	----

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05604
SITE ID: SO-49000-100500-0,2-1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6	10	7.8	78
ARSENIC	8.9	4	12.6	93
BARIUM	221	200	402	90.5
BERYLLIUM	0.81	5	5.8	100
CADMIUM	1.34	5	6.18	96.8
CALCIUM	----	NA	----	----
CHROMIUM	22.1	20	41.7	98
COBALT	10	50	57.4	94.8
COPPER	18.2	25	41.2	92
IRON	----	NA	----	----
LEAD	10	50	59.1	98.2
MAGNESIUM	----	NA	----	----
MANGANESE	616	50	625	NC
MERCURY	<0.1	1	1.02	102
NICKEL	23.8	50	68.8	90
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	1.31	5	5.54	84.6
SODIUM	----	NA	----	----
THALLIUM	<1.0	5	4.8	96
VANADIUM	37.5	50	80.4	85.8
ZINC	42.8	50	84.7	83.8
LITHIUM	----	NA	----	----

WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05620
SITE ID: SO-49132-100440-10,12,1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6.0	50	52	104
ARSENIC	2.35	4	7.75	135
BARIUM	46.6	200	243	98
BERYLLIUM	0.86	5	4.75	78
CADMIUM	<0.50	5	4.2	84
CALCIUM	----	NA	----	----
CHROMIUM	11.6	20	32.7	106
COBALT	<5.0	50	47	94
COPPER	4.61	25	25.6	84
IRON	----	NA	----	----
LEAD	<0.5	50	55	110
MAGNESIUM	----	NA	----	----
MANGANESE	60.3	50	117	113
MERCURY	<0.1	1	1.01	101
NICKEL	7.42	50	48.7	83
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	<0.3	5	3.76	75
SODIUM	----	NA	----	----
THALLIUM	<1.0	5	5.5	110
VANADIUM	7.92	50	60.2	105
ZINC	16.1	50	65.2	98
LITHIUM	----	NA	----	----

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05632
SITE ID: SO-49000-100665-2,4-1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6	10	20.1	201
ARSENIC	8.15	4	11.19	76
BARIUM	121	200	347	113
BERYLLIUM	0.68	5	5.66	99.6
CADMIUM	<0.5	5	5.33	106.6
CALCIUM	----	NA	----	----
CHROMIUM	19.9	20	35.5	78
COBALT	7.65	50	53.5	91.7
COPPER	7.3	25	29.2	87.6
IRON	----	NA	----	----
LEAD	8.3	50	53.7	90.8
MAGNESIUM	----	NA	----	----
MANGANESE	511	50	722	NC
MERCURY	<0.1	1	0.93	93
NICKEL	14.9	50	60.8	91.8
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	<1.0	5	4.79	95.8
SODIUM	----	NA	----	----
THALLIUM	<0.5	5	4.7	94
VANADIUM	28.6	50	76.9	96.6
ZINC	26.9	50	67.5	81.2
LITHIUM	----	NA	----	----

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WSSRAP
SOIL SPIKES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05643
SITE ID: SO-49082-100570-0,2-1187

	SAMPLE CONC	SPIKE CONC	SAMPLE+SPIKE	PERCENT RECOVERY
ALUMINUM	----	NA	----	----
ANTIMONY	<6.0	10	16.4	164
ARSENIC	14.6	4	16.7	NC
BARIUM	194	200	364	85
BERYLLIUM	0.7	5	6.02	106.4
CADMIUM	<0.5	5	5.46	109.2
CALCIUM	----	NA	----	----
CHROMIUM	15	20	47.9	165
COBALT	7.11	50	54.9	95
COPPER	14	25	38.5	0.98
IRON	----	NA	----	----
LEAD	5.57	50	56.1	101
MAGNESIUM	----	NA	----	----
MANGANESE	405	50	390	NC
MERCURY	<0.1	1	0.75	75
NICKEL	15.6	50	67.5	103.8
POTASSIUM	----	NA	----	----
SELENIUM	<0.5	1	<0.5	0
SILVER	<1.0	5	4.61	92.2
SODIUM	----	NA	----	----
THALLIUM	<0.5	5	3.6	72
VANADIUM	24.4	50	77.7	106.6
ZINC	36.3	50	86.9	100.6
LITHIUM	----	NA	----	----

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WSSRAP
SOIL DUPLICATES
MATRIX: SOIL
UNITS: UG/KG

SAMPLE NO: AA05327
SITE ID: SO-50140-98820-2,4-1187

	RESULT #1	RESULT #2
ALUMINUM	14568	13350
ANTIMONY	ND	ND
ARSENIC	5	8.18
BARIUM	88.7	80
BERYLLIUM	1.5	1.2
CADMIUM	0.8	0.55
CALCIUM	3816	2725
CHROMIUM	23.2	19.6
COBALT	8.5	7
COPPER	17.2	13.4
IRON	23129	17950
LEAD	11.7	8.8
LITHIUM	ND	ND
MAGNESIUM	2622	2150
MANGANESE	107	74.5
MERCURY	ND	ND
NICKEL	25.8	20.1
POTASSIUM	ND	590
SELENIUM	ND	ND
SILVER	ND	ND
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	38.9	33.5
ZINC	38.6	38.1

SAMPLE NO: AA05334
SITE ID: SO-50230-98991-4,6-1187

	RESULT #1	RESULT #2
ALUMINUM	10245	9430
ANTIMONY	ND	ND
ARSENIC	5.9	4.29
BARIUM	171.2	216
BERYLLIUM	0.8	0.71
CADMIUM	ND	0.62
CALCIUM	1900	1622
CHROMIUM	16.4	15.4
COBALT	5.9	7.5
COPPER	19.6	16.9
IRON	12902	12020
LEAD	8.1	11.1
LITHIUM	7.6	7.14
MAGNESIUM	1872	1600
MANGANESE	259	586
MERCURY	ND	ND
NICKEL	10.6	15.1
POTASSIUM	ND	ND
SELENIUM	ND	ND
SILVER	ND	ND
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	29.1	27.7
ZINC	29.2	25.8

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WSSRAP
SOIL DUPLICATES
MATRIX: SOIL
UNITS: UG/KG

SAMPLE NO: AA05563
SITE ID: SO-49000-100180-2,4-1187

	RESULT #1	RESULT #2
ALUMINUM	30009	15030
ANTIMONY	ND	ND
ARSENIC	34	20.7
BARIUM	98	83
BERYLLIUM	1	0.69
CADMIUM	ND	ND
CALCIUM	4584	3400
CHROMIUM	31.8	17.1
COBALT	ND	ND
COPPER	10.8	6.8
IRON	24651	15560
LEAD	4.5	ND
LITHIUM	11.2	5.4
MAGNESIUM	3494	2160
MANGANESE	86.4	90.8
MERCURY	ND	ND
NICKEL	14.3	9.37
POTASSIUM	ND	ND
SELENIUM	ND	ND
SILVER	ND	ND
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	49.8	35.4
ZINC	33.8	17.7

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WSSRAP
SOIL DUPLICATES
MATRIX: SOIL
UNITS: UG/KG

SAMPLE NO: AA05605
SITE ID: SO-49000-100500-2,4-1187

	RESULT #1	RESULT #2
ALUMINUM	10638	13740
ANTIMONY	ND	ND
ARSENIC	7.9	7.17
BARIUM	195	123
BERYLLIUM	0.7	0.64
CADMIUM	0.9	0.61
CALCIUM	2113	1980
CHROMIUM	17.9	21.8
COBALT	11.3	5.6
COPPER	13.2	11.6
IRON	14916	13820
LEAD	14.5	9.32
LITHIUM	8.9	11.3
MAGNESIUM	2101	2210
MANGANESE	802	141
MERCURY	ND	ND
NICKEL	12.5	12
POTASSIUM	ND	520
SELENIUM	ND	ND
SILVER	1.3	ND
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	33.9	34.9
ZINC	27	28.4

SAMPLE NO: AA05285
SITE ID: SO-51360-101175-6,8-1187

	RESULT #1	RESULT #2
ALUMINUM	15031	12400
ANTIMONY	ND	ND
ARSENIC	6.7	4.89
BARIUM	136.9	127
BERYLLIUM	0.8	0.84
CADMIUM	0.7	0.51
CALCIUM	1918	1565
CHROMIUM	20.8	21.9
COBALT	19.9	18.1
COPPER	9.8	8.6
IRON	15728	15620
LEAD	14.4	14.7
LITHIUM	12.3	9.1
MAGNESIUM	1877	1550
MANGANESE	643	755
MERCURY	ND	ND
NICKEL	10.4	11.2
POTASSIUM	ND	575
SELENIUM	ND	ND
SILVER	1.5	1.88
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	36.5	36.4
ZINC	22.3	18.9

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WSSRAP
SOIL DUPLICATES
MATRIX: SOIL
UNITS: UG/G

SAMPLE NO: AA05622
SITE ID: SO-49132-100440-14,16,-1187

	RESULT #1	RESULT #2
ALUMINUM	12524	12560
ANTIMONY	ND	ND
ARSENIC	14.9	4.97
BARIUM	59.4	52.7
BERYLLIUM	1.2	0.63
CADMIUM	ND	ND
CALCIUM	3425	3240
CHROMIUM	17.5	15.3
COBALT	ND	ND
COPPER	10.9	10.2
IRON	20505	21700
LEAD	8.3	7.2
LITHIUM	ND	ND
MAGNESIUM	1809	1725
MANGANESE	173	132
MERCURY	ND	ND
NICKEL	20.9	ND
POTASSIUM	ND	ND
SELENIUM	ND	ND
SILVER	ND	ND
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	38.3	33.6
ZINC	20.2	15.7

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WSSRAP
SOIL DUPLICATES
MATRIX: SOIL
UNITS: UG/KG

SAMPLE NO: AA05632
SITE ID: SO-49000-100665-2,4-1187

	RESULT #1	RESULT #2
ALUMINUM	10528	9377
ANTIMONY	ND	ND
ARSENIC	9.2	7
BARIUM	229	121
BERYLLIUM	0.8	0.68
CADMIUM	ND	ND
CALCIUM	1611	1445
CHROMIUM	17.2	19.9
COBALT	10.9	7.7
COPPER	7.5	7.3
IRON	13813	12780
LEAD	8.9	8.3
LITHIUM	8.7	8.2
MAGNESIUM	2005	1790
MANGANESE	610	511
MERCURY	ND	ND
NICKEL	18.6	14.9
POTASSIUM	ND	ND
SELENIUM	ND	ND
SILVER	ND	ND
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	31	28.6
ZINC	28.3	26.9

SAMPLE NO: AA05644
SITE ID: SO-49082-100570-2,4-1187

	RESULT #1	RESULT #2
ALUMINUM	7401	10690
ANTIMONY	ND	ND
ARSENIC	10	11.6
BARIUM	175	216
BERYLLIUM	0.8	0.69
CADMIUM	ND	0.60
CALCIUM	1865	1690
CHROMIUM	16	25.1
COBALT	7.9	8.78
COPPER	36.5	15.0
IRON	13910	12850
LEAD	7.7	4.9
LITHIUM	ND	9.9
MAGNESIUM	1830	2030
MANGANESE	611	329
MERCURY	ND	ND
NICKEL	14.2	123
POTASSIUM	ND	ND
SELENIUM	ND	ND
SILVER	ND	ND
SODIUM	ND	ND
THALLIUM	ND	ND
VANADIUM	30	31
ZINC	26.4	30.9

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NITROAROMATICS - SOILS
MS/MSD RESULTS
PERCENT RECOVERY

SAMPLE # AA05328
SITE ID: SO-50140,98820

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	95	97
1,3-DNB	96	96
NITROBENZENE	99	101
2,4,6-TNT	84	84
2,6-DNT	84	87
2,4-DNT	70	72

SAMPLE # AA05335
SITE ID: SO-50230,98991

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	103	99
1,3-DNB	106	97
NITROBENZENE	118	103
2,4,6-TNT	92	89
2,6-DNT	96	87
2,4-DNT	80	74

SAMPLE # AA05339
SITE ID: SO-50160,98735

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	96	98
1,3-DNB	96	97
NITROBENZENE	101	99
2,4,6-TNT	86	82
2,6-DNT	86	84
2,4-DNT	72	72

SAMPLE # AA05342
SITE ID: SO-50160,98735

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	90	104
1,3-DNB	90	101
NITROBENZENE	97	107
2,4,6-TNT	69	89
2,6-DNT	80	90
2,4-DNT	68	77

SAMPLE # AA05345
SITE ID: SO-50160,98735

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	98	97
1,3-DNB	95	96
NITROBENZENE	100	102
2,4,6-TNT	85	86
2,6-DNT	87	87
2,4-DNT	74	72

SAMPLE # AA05348
SITE ID: SO-50160,98735

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	94	89
1,3-DNB	94	88
NITROBENZENE	101	94
2,4,6-TNT	82	79
2,6-DNT	84	84
2,4-DNT	70	66

SAMPLE # AA05615
SITE ID: SO-49132,100440

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	71	66
1,3-DNB	110	105
NITROBENZENE	95	97
2,4,6-TNT	51	56
2,6-DNT	87	87
2,4-DNT	116	112

SAMPLE # AA05623
SITE ID: SO-49101,100500

ANALYTE	MATRIX SPIKE	MATRIX SPIKE DUP
1,3,5-TNB	85	85
1,3-DNB	100	101
NITROBENZENE	94	106
2,4,6-TNT	74	76
2,6-DNT	86	86
2,4-DNT	107	111

3D
SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: metaTRACE Contract: 100-03

Lab Code: meta Case No.: ______ SAS No.: ______ SDG No.: ______

Matrix Spike - EPA Sample No.: 5338, 39, 40 Level:(low/med) low

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
Phenol	6700	0	3600	54	26- 90
2-Chlorophenol	6700	0	3300	49	25-102
1,4-Dichlorobenzene	3300	0	2200	67	28-104
N-Nitroso-di-n-prop.(1)	3300	0	1700	52	41-126
1,2,4-Trichlorobenzene	3300	0	2100	64	38-107
4-Chloro-3-methylphenol	6700	0	3300	49	26-103
Acenaphthene	3300	0	1000	30*	31-137
4-Nitrophenol	6700	0	2600	39	11-114
2,4-Dinitrotoluene	3300	0	1400	42	28- 89
Pentachlorophenol	6700	0	0	0*	17-109
Pyrene	3300	0	2800	85	35-142

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	6700	4800	72	14	35	26- 90
2-Chlorophenol	6700	3300	49	0	50	25-102
1,4-Dichlorobenzene	3300	190	6*	84*	27	28-104
N-Nitroso-di-n-prop.(1)	3300	1900	58	5	38	41-126
1,2,4-Trichlorobenzene	3300	1600	48	14	23	38-107
4-Chloro-3-methylphenol	6700	6000	90	29	33	26-103
Acenaphthene	3300	1900	58	22*	19	31-137
4-Nitrophenol	6700	4800	72	30	50	11-114
2,4-Dinitrotoluene	3300	2900	88	35	47	28- 89
Pentachlorophenol	6700	2200	3*	100*	47	17-109
Pyrene	3300	6000	182*	64*	36	35-142

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 4 out of 11 outside limits
Spike Recovery: 5 out of 22 outside limits

COMMENTS: ______

metaTRACE, Inc. ■ 13715 Rider Trail North ■ Earth City, MO 63045 ■ (314) 298-8566

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: metaTRACE Contract: 100-03

Lab Code: meta Case No.: ____ SAS No.: ____ SDG No.: ____

Matrix Spike - EPA Sample No.: 5344, 45, 46 Level:(low/med) low

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
Phenol	6700	0	4600	67	26- 90
2-Chlorophenol	6700	0	3900	58	25-102
1,4-Dichlorobenzene	3300	0	1800	54	28-104
N-Nitroso-di-n-prop.(1)	3300	0	2000	61	41-126
1,2,4-Trichlorobenzene	3300	0	1700	52	38-107
4-Chloro-3-methylphenol	6700	0	4000	60	26-103
Acenaphthene	3300	0	1300	39	31-137
4-Nitrophenol	6700	0	3300	49	11-114
2,4-Dinitrotoluene	3300	0	1700	52	28- 89
Pentachlorophenol	6700	0	3100	46	17-109
Pyrene	3300	56	3500	104	35-142

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	6700	4000	60	6	35	26- 90
2-Chlorophenol	6700	3100	46	12	50	25-102
1,4-Dichlorobenzene	3300	1200	36	20	27	28-104
N-Nitroso-di-n-prop.(1)	3300	2300	70	7	38	41-126
1,2,4-Trichlorobenzene	3300	900	27*	32*	23	38-107
4-Chloro-3-methylphenol	6700	4000	60	0	33	26-103
Acenaphthene	3300	800	24*	24*	19	31-137
4-Nitrophenol	6700	5600	84	26	50	11-114
2,4-Dinitrotoluene	3300	1400	42	11	47	28- 89
Pentachlorophenol	6700	4200	63	16	47	17-109
Pyrene	3300	1400	42	42*	36	35-142

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 3 out of 11 outside limits
Spike Recovery: 2 out of 22 outside limits

COMMENTS:

metaTRACE, Inc. 13715 Rider Trail North Earth City, MO 63045 (314) 298-8566

3D
SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: metaTRACE Contract: 100-03

Lab Code: meta Case No.: ______ SAS No.: ______ SDG No.: ______

Matrix Spike - EPA Sample No.: 5350, 51, 52 Level:(low/med) low

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
Phenol	6700	14J	5400	80	26- 90
2-Chlorophenol	6700	11J	4400	65	25-102
1,4-Dichlorobenzene	3300	0	2100	64	28-104
N-Nitroso-di-n-prop.(1)	3300	0	2000	61	41-126
1,2,4-Trichlorobenzene	3300	0	2500	76	38-107
4-Chloro-3-methylphenol	6700	0	5200	78	26-103
Acenaphthene	3300	0	1600	48	31-137
4-Nitrophenol	6700	0	4800	72	11-114
2,4-Dinitrotoluene	3300	0	2200	67	28- 89
Pentachlorophenol	6700	0	3700	55	17-109
Pyrene	3300	0	3300	100	35-142

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	6700	3700	55	18	35	26- 90
2-Chlorophenol	6700	2800	42	21	50	25-102
1,4-Dichlorobenzene	3300	1300	39	24	27	28-104
N-Nitroso-di-n-prop.(1)	3300	1400	42	18	38	41-126
1,2,4-Trichlorobenzene	3300	1500	45	26*	23	38-107
4-Chloro-3-methylphenol	6700	3700	55	17	33	26-103
Acenaphthene	3300	1100	33	18	19	31-137
4-Nitrophenol	6700	3400	51	17	50	11-114
2,4-Dinitrotoluene	3300	1600	48	16	47	28- 89
Pentachlorophenol	6700	2800	42	13	47	17-109
Pyrene	3300	2700	82	10	36	35-142

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 11 outside limits
Spike Recovery: 0 out of 22 outside limits

COMMENTS: ______________________________

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3F

SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: metaTRACE Contract: 100-03

Lab Code: meta Case No.: ______ SAS No.: ______ SDG No.: ______

Matrix Spike - EPA Sample No.: 5342 MS / 5343 MSD Level:(low/med) ______

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
gamma-BHC (Lindane)	26.7	0.0	13.03	48.8	46-127
Heptachlor	26.7	0.0	9.07	34.0*	35-130
Aldrin	26.7	0.0	8.89	33.3*	34-132
Dieldrin	66.7	0.0	39.24	58.8	31-134
Endrin	66.7	0.0	39.42	59.1	42-139
4,4'-DDT	66.7	0.0	203.18	304.6*	23-134

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
gamma-BHC (Lindane)	26.7	7.72	28.9*	51.2*	50	46-127
Heptachlor	26.7	7.11	26.6*	24.4	31	35-130
Aldrin	26.7	6.17	23.1*	36.2	43	34-132
Dieldrin	66.7	32.30	48.4	19.4	38	31-134
Endrin	66.7	27.73	41.6*	34.7	45	42-139
4,4'-DDT	66.7	377.73	566.3*	60.1*	50	23-134

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 2 out of 6 outside limits
Spike Recovery: 8 out of 12 outside limits

COMMENTS: ______________________________

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SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: metaTRACE Contract: 100-03

Lab Code: meta Case No.: ______ SAS No.: ______ SDG No.: ______

Matrix Spike - EPA Sample No.: 5645 MS
5645 MSD
Level:(low/med) ______

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
gamma-BHC (Lindane)	26.7	0.0	9.31	34.9*	46-127
Heptachlor	26.7	0.0	21.59	80.9	35-130
Aldrin	26.7	0.0	13.66	51.2	34-132
Dieldrin	66.7	0.0	20.77	31.1	31-134
Endrin	66.7	0.0	29.90	44.8	42-139
4,4'-DDT	66.7	0.0	89.55	134.3*	23-134

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
gamma-BHC (Lindane)	26.7	8.92	33.4*	4.4	50	46-127
Heptachlor	26.7	21.51	80.6	0.4	31	35-130
Aldrin	26.7	14.30	53.6	4.6	43	34-132
Dieldrin	66.7	20.60	30.9*	0.6	38	31-134
Endrin	66.7	29.41	44.1	1.6	45	42-139
4,4'-DDT	66.7	84.07	126.0	6.4	50	23-134

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 6 outside limits
Spike Recovery: 4 out of 12 outside limits

COMMENTS: ______

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SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: metaTRACE Contract: 100-03

Lab Code: meta Case No.: ______ SAS No.: ______ SDG No.: AA05714

Matrix Spike - EPA Sample No.: 5714 MS Level:(low/med) low
5714 MSD

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
gamma-BHC (Lindane)	26.7	0.0	20.3	76.0	46-127
Heptachlor	26.7	0.0	27.6	103.4	35-130
Aldrin	26.7	0.0	14.5	54.3	34-132
Dieldrin	66.7	0.0	46.0	69.0	31-134
Endrin	66.7	0.0	21.8	32.7	42-139
4,4'-DDT	66.7	0.0	0.0	0.0*	23-134

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
gamma-BHC (Lindane)	26.7	14.4	53.9	34.0	50	46-127
Heptachlor	26.7	10.7	40.1	88.3*	31	35-130
Aldrin	26.7	7.44	27.9*	64.2*	43	34-132
Dieldrin	66.7	29.2	43.8	44.7*	38	31-134
Endrin	66.7	26.0	39.0*	17.6	45	42-139
4,4'-DDT	66.7	8.31	12.5*	200*	50	23-134

\# Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 4 out of 6 outside limits
Spike Recovery: 4 out of 12 outside limits

COMMENTS: ______________________

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Administrative Record

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IRA-200-203

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June 1, 1988

ADDRESSEES

INTERIM RESPONSE ACTION FOR THE ASH POND ISOLATION SYSTEM

Enclosed you will find the revised Engineering Evaluation/ Cost Analysis for the referenced Interim Response Action. This document has been revised to reflect comments received from the EPA and the MDNR (there were no comments from the public) and serves as the responsiveness summary for this response action. It is my understanding that responses to comments have, for the most part, been coordinated with your organization. Therefore, subject to your indication to the contrary we assume that this completes the environmental documentation requirements for this action.

We will complete final design within the next three weeks and will then proceed to award a contract for the work.

If you have any questions, please give me a call.

Sincerely,

J H McEnach
for
R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure

cc w/enclosure:
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DOCUMENT NUMBER I-200-203-1.01

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PROPOSED INTERIM RESPONSE ACTION: EE/CA

CONSTRUCTION OF ASH POND ISOLATION SYSTEM
AT THE WELDON SPRING SITE

May 1988

DOCUME

DOCUMENT NUMBER: I-200-203-1.02

PROPOSED INTERIM RESPONSE ACTION:

CONSTRUCTION OF ASH POND ISOLATION SYSTEM AT THE WELDON SPRING SITE

SITE BACKGROUND

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metals were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. Some of the buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the ordnance works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE.

The Ash Pond area is located in the far northwest section of the Weldon Spring site and has the lowest surface elevation on the site (Fig. 1). Water is present only intermittently in Ash Pond and is recharged by surface runoff. The watershed of Ash Pond includes the area around the raffinate pits and and the western quarter (about 25 ha [62 acres]) of the chemical plant area (Fig. 2). Discharge from Ash Pond flows northward to Lake 35, an impoundment on Schote Creek in the August A. Busch Memorial Wildlife Area (U.S. Department of Energy 1987a). Based on the results of dye studies conducted at the site by the Missouri Department of Natural Resources in 1983, a hydraulic connection exists between the Ash Pond outflow stream and Burgermeister Spring, which is also located in the Busch Wildlife Area (Dean 1985). Routine environmental monitoring of intermittent surface runoff has identified substantial levels of uranium contamination in the runoff from Ash Pond.

In order to decrease the release of contaminants off-site, it is proposed that an isolation system (e.g., a dike and diversion channels) be constructed upstream of Ash Pond to limit the flow of surface water over the contaminated area. This report documents the proposed Ash Pond construction project as an interim response action.

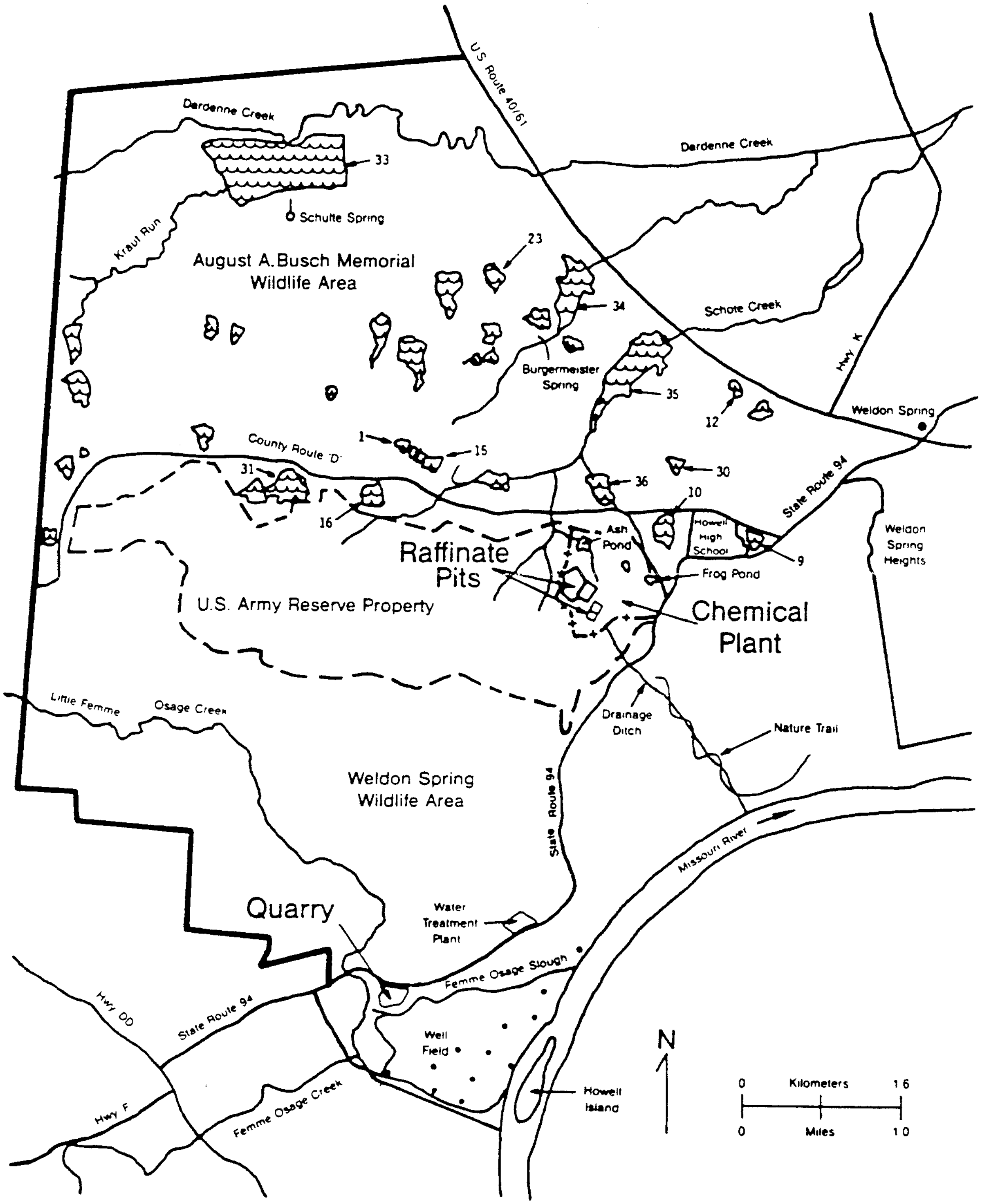

FIGURE 1 Map of the Weldon Spring Site and Vicinity (Source: Modified from U.S. Department of Energy 1987a)

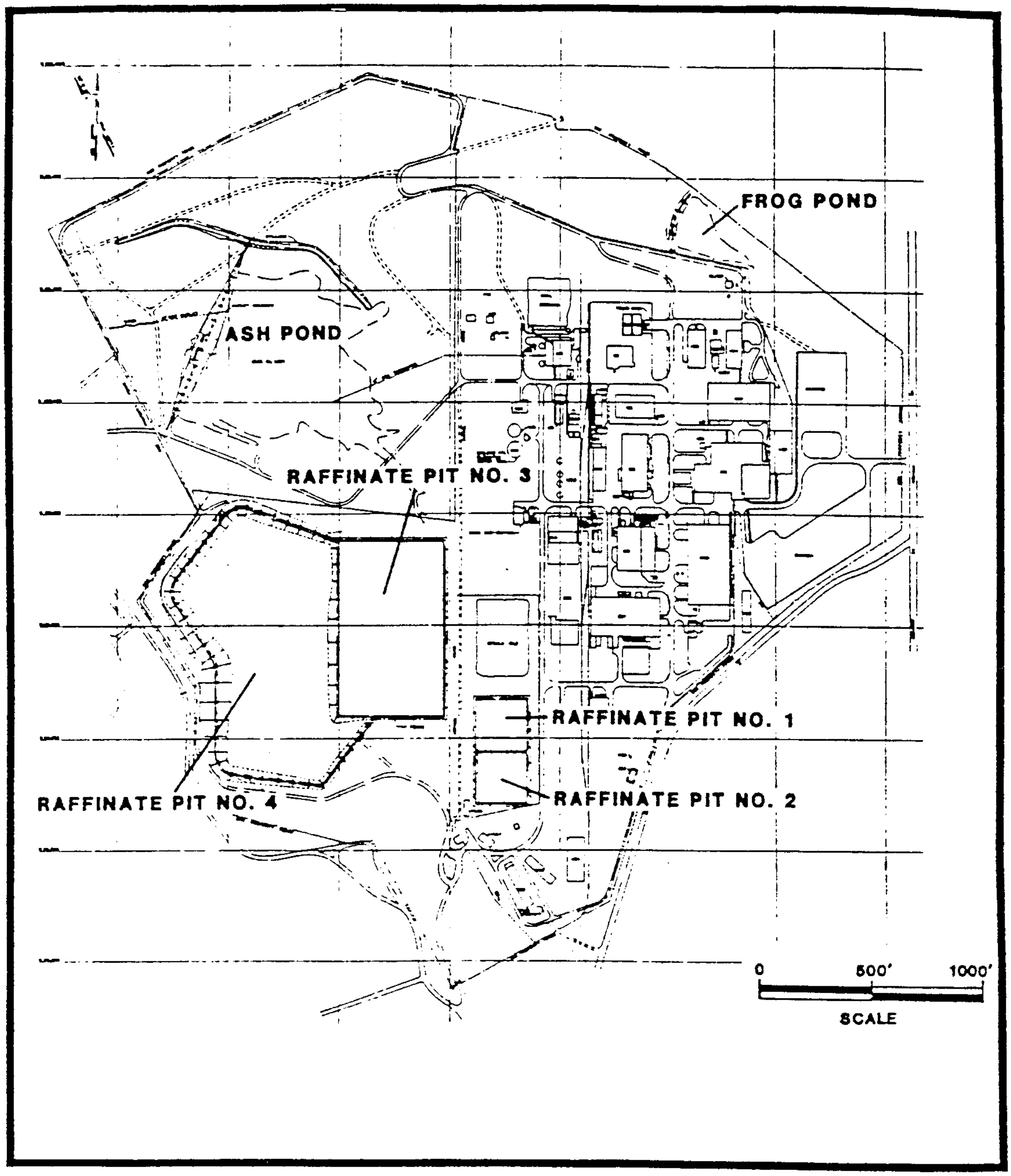

FIGURE 2 Layout of the Weldon Spring Raffinate Pits and Chemical Plant Area

SITE CHARACTERIZATION

Surface Water

A preliminary radiological survey of the Weldon Spring site was performed in 1975. Analyses of water samples from Ash Pond indicated that the concentrations of radium, thorium, and uranium were less than their maximum permissible concentrations (MPCs) as specified in 10 CFR Part 20 (Jacobson 1976; U.S. Department of the Army 1976). (At the time of the survey, 10 CFR Part 20 was the appropriate regulation because the site was under control of the U.S. Department of the Army.) Subsequent radiological sampling identified uranium concentrations in excess of the currently appropriate guideline, i.e., the DOE guideline for uranium-238 in water (600 pCi/L) (U.S. Department of Energy 1986). Levels as high as 4,000 pCi/L were detected in surface runoff from Ash Pond compared with levels up to 400 pCi/L in the watershed upstream from Ash Pond (Kleeschulte and Emmett 1986; MK-Ferguson and Jacobs Engineering 1987).

Recent characterization efforts at the Weldon Spring site have included more extensive sampling for uranium in surface runoff from the Ash Pond watershed. The locations of the sampling points, shown in Fig. 3, were selected because water passing between these points must cross over the known source of radioactive contamination in the watershed -- i.e., the South Dump, which was used for disposal of contaminated material during both the uranium-processing period and the Army's decontamination effort at the site.

Results of the runoff sampling program are presented in Table 1. Because rainfall during the months of April, May, June, August, September, October, and November 1987 was insufficient to produce any flow from the watershed, no water samples were collected during those months. The variable results reflect the nature of the sampling method (i.e., grab samples) and the variable flow volumes. To permit the level of contamination to be more accurately determined, procedures and equipment for continuous monitoring and sequential sampling of surface runoff leaving the area were recently put in place; this effort was completed during May 1988.

Geology and Groundwater

During a recent comprehensive characterization of the Weldon Spring site, several boreholes were drilled in and near Ash Pond (see Fig. 4) to define the physical nature of the area. Analysis of these borehole samples indicated that layers of low-permeability clay are present in the area, with thicknesses ranging from 1.5 to 6 m (5 to 20 ft). The thinnest deposits are present in the existing drainage channel, where compacted fill would be placed during the proposed construction project. A cross section of the Ash Pond area is presented in Fig. 5.

Two piezometers placed in the overburden material immediately south of the proposed dike indicate that the local soil is unsaturated. Groundwater in the area occurs

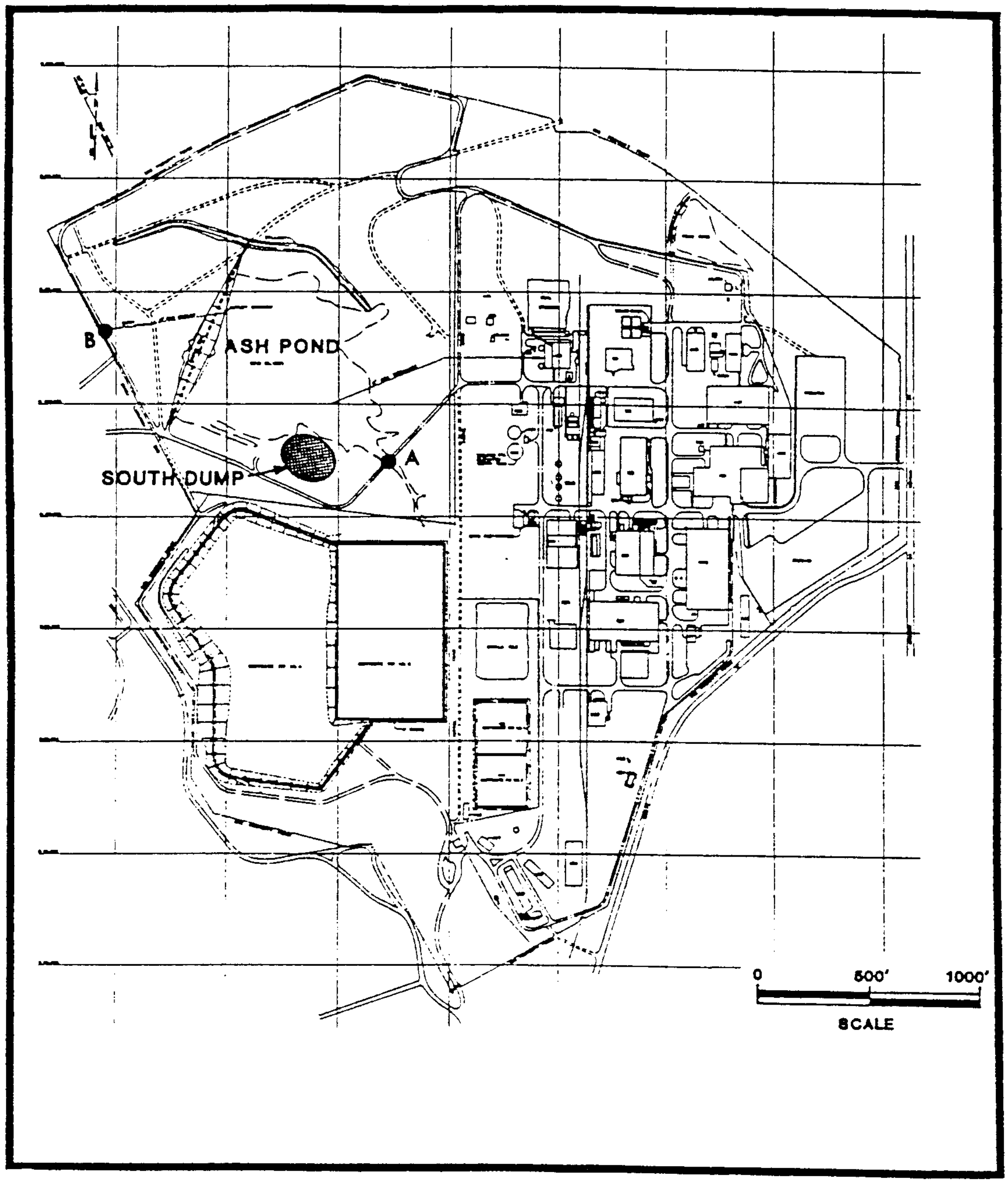

FIGURE 3 Sampling Locations for Uranium in Surface Water at Ash Pond

TABLE 1 Uranium Concentrations in Surface Runoff at the Ash Pond Sampling Points[a]

	Natural Uranium (pCi/L)			
	1987		1988	
Month	Point A	Point B	Point A	Point B
January	–[b]	3,500	140	2,700
			140	2,800
			45	1,800
			110	1,700
			200	360
February	–	3,100	100	460
			180	900
March	380	2,100		
July	100	250		
December	–	960		
	–	1,500		
	–	1,200		
	–	1,800		

[a]The locations of Point A (upstream) and Point B (site boundary) are shown in Fig. 3.

[b]A dash indicates that no data were collected.

in the bedrock, approximately 9 m (30 ft) below the ground surface. Groundwater recharge through this temporary impoundment would be minimal. However, should it occur, the underlying soils would be expected to adsorb contaminants and thus limit migration. (Soils in the area exhibit low hydraulic conductivity and favorable cation exchange properties.) In addition, the proposed upstream isolation dike and diversion channels would significantly reduce the amount of water entering the Ash Pond area, which is believed to be a shallow groundwater recharge area. The resultant decrease in hydraulic head would decrease the rate of infiltration through the contaminated locations in the Ash Pond area (e.g., the South Dump). Based on the thickness and nature of the soils in the affected area, the proposed Ash Pond dike and diversion system would not create a significant groundwater recharge zone. In addition, any water recharging the groundwater from this zone would contain lower levels of uranium than have been

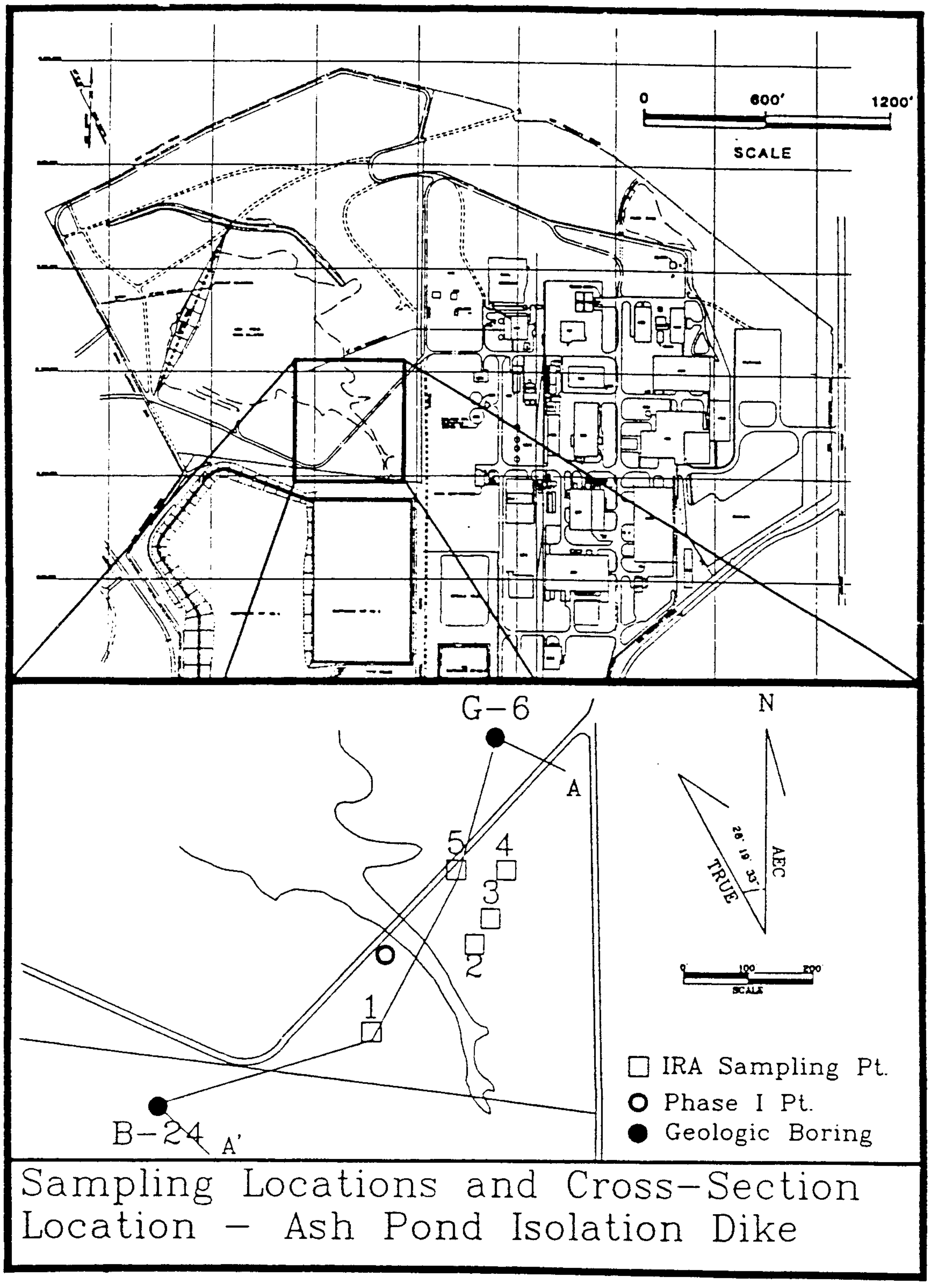

FIGURE 4 Location of Boreholes in the Ash Pond Area

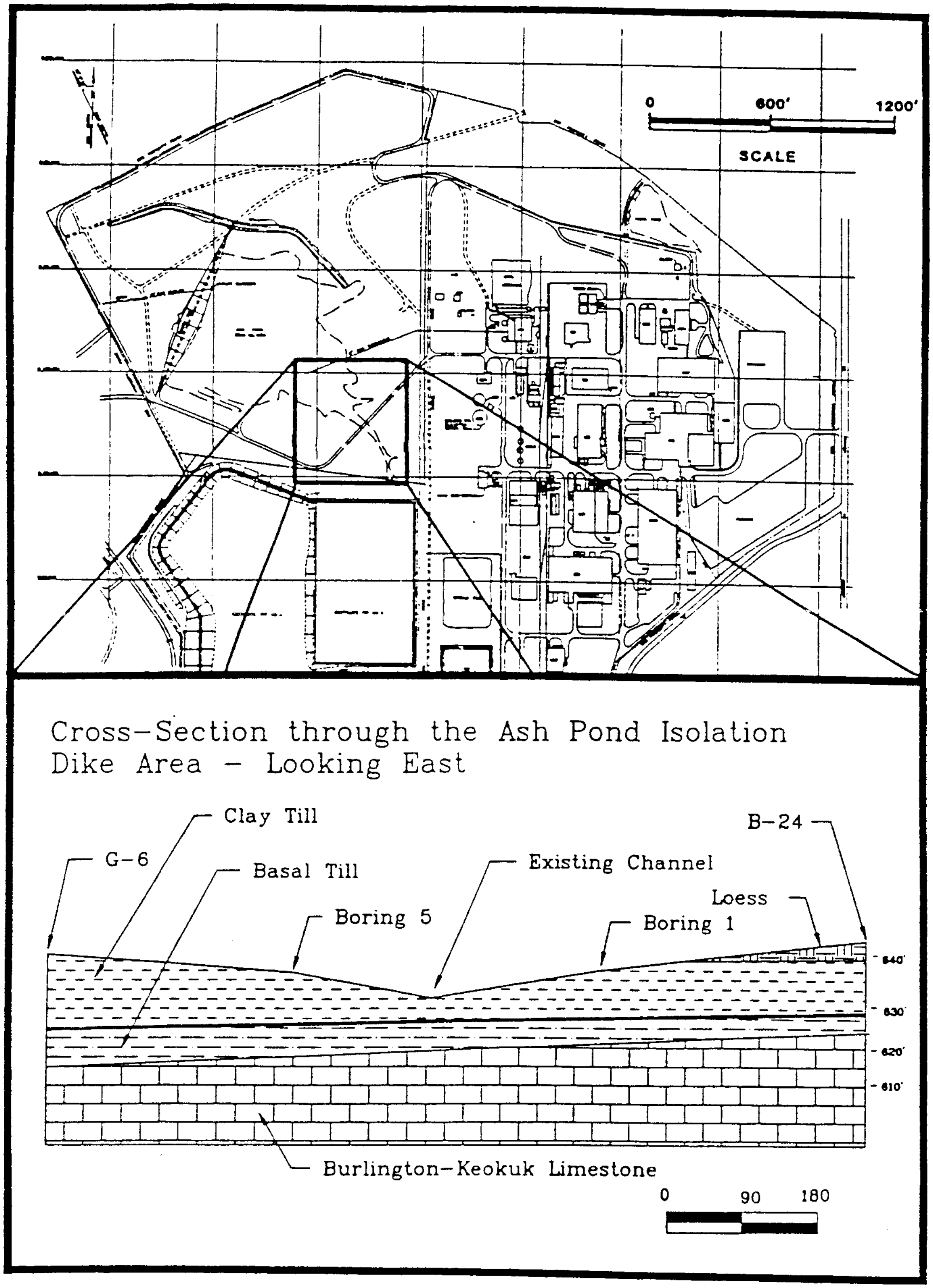

FIGURE 5 Geologic Cross Section of the Ash Pond Area

detected in the losing stream located immediately west of the site. Thus, an improvement in the quality of surface water leaving the Ash Pond area would also improve the quality of the subsurface system (MK-Ferguson and Jacobs Engineering 1988).

Soils

Soils in the Ash Pond area were probably radioactively contaminated as a result of previous processing activities at the Weldon Spring site, migration from the South Dump adjacent to Ash Pond, and past discharges to the pond of decant liquids from the area between raffinate pits 1 and 3 resulting from process line breakage. No known chemical hazards currently exist in the Ash Pond area (MK-Ferguson and Jacobs Engineering 1987).

The Phase I soil investigation program, consisting of a comprehensive radiological and chemical characterization of site soils, was recently completed at the Weldon Spring site (MK-Ferguson and Jacobs Engineering 1988). For the chemical characterization, subsurface soil samples were collected from several boreholes in and around the area proposed for the Ash Pond isolation system (see Fig. 4). These borehole samples Fig. 4) were analyzed for metals, nitroaromatics, inorganic ions (nitrate, sulfate, chloride, and fluoride), and moisture content. Select samples were also analyzed for semivolatile compounds, pesticides, and polychlorinated biphenyls. The results indicated that only nitrate and sulfate levels are slightly elevated, and no chemical hazards exist in the area proposed for the isolation system (MK-Ferguson and Jacobs Engineering 1988).

It is proposed that borrow material for construction of the Ash Pond isolation system be obtained from a spoils pile that is located north of raffinate pit 1 and east of raffinate pit 3 (Fig. 6). This pile probably resulted from the excavation of raffinate pit 4 and typically consists of clayey soils. The spoils pile was chemically characterized during the Phase I soil investigation program. Samples were collected from two locations in the pile and analyzed for metals, nitroaromatics, inorganic ions, and moisture content. No elevated concentrations of chemical contaminants were detected in the samples.

The Ash Pond and spoils pile areas were also surveyed for radiological contamination. The methods employed and values measured during this effort are described in detail in the radiological characterization report for the site (Marutzky et al. 1988). Sampling results for the spoils pile indicate that there is no uranium contamination and that concentrations of radium and thorium are below current DOE guidelines for residual radionuclides in soil (U.S. Department of Energy 1987b), which are provided in Appendix A. (Although DOE has established generic guidelines for radium and thorium in soil, there is no similar guideline for uranium. The guideline for uranium in soil is derived on a site-specific basis.) The pertinent results for the Ash Pond/South Dump area are summarized below.

The analyses of soil samples identified one area south of Ash Pond with a radium-226 concentration above the near-surface (i.e., upper 15 cm [6 in.]) soil guideline,

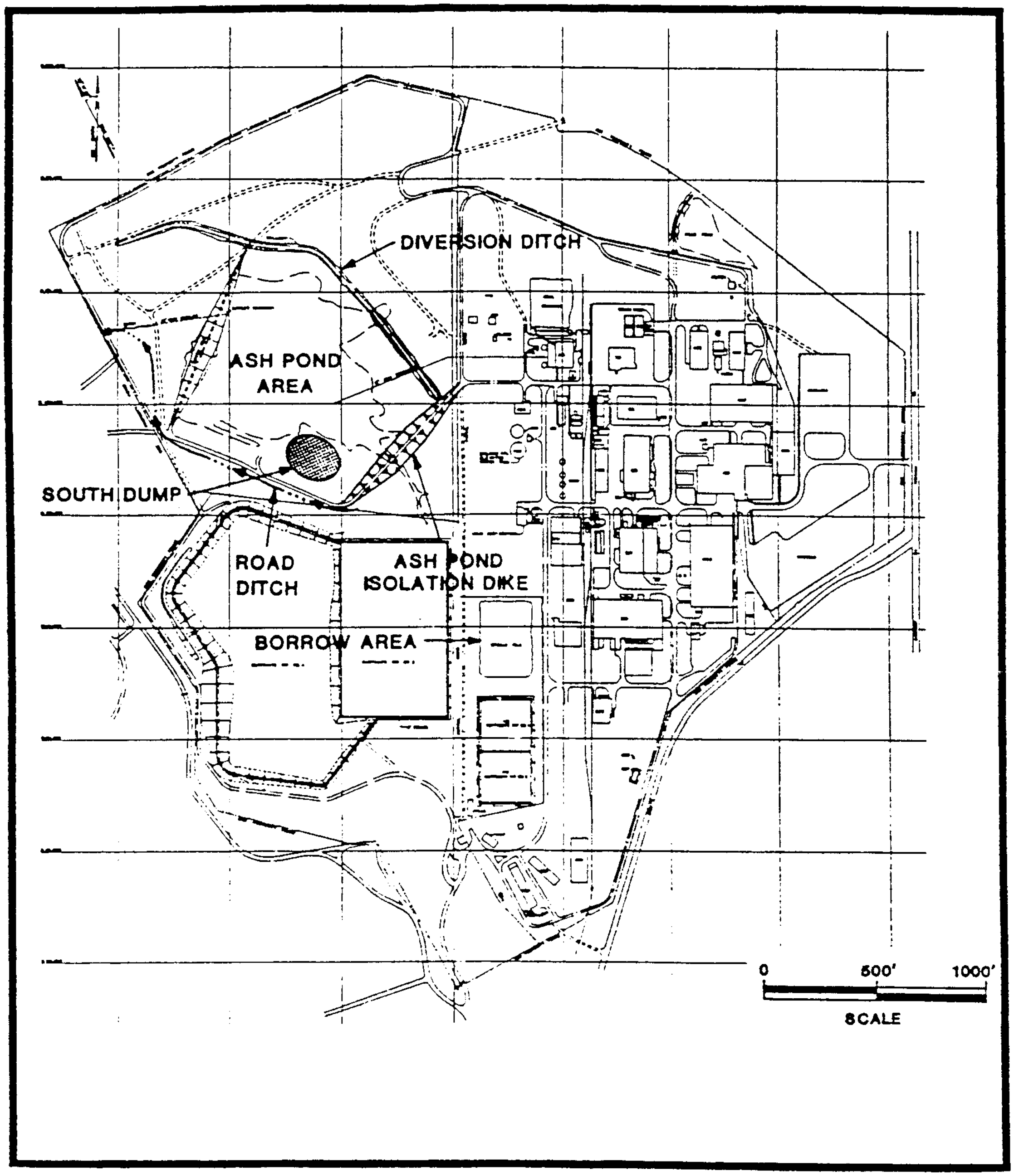

FIGURE 6 Location of Proposed Dike and Borrow Area (Source: Modified from MK-Ferguson and Jacobs Engineering 1987)

but there were no measurements above the guideline for thorium-232 in the area affected by the proposed isolation system. Uranium contamination was detected in the South Dump.

Spectrometric measurements identified two locations southeast of Ash Pond with radium-226 concentrations above the near-surface soil guideline, but no measurements of thorium-232 in the area exceeded the appropriate guideline. Exposure-rate measurements were above background levels in the South Dump.

The subsurface drilling and sampling effort identified the presence of elevated thorium-230 concentrations in the South Dump and elevated uranium concentrations in the Ash Pond/South Dump area. The near-surface soil limit of 5 pCi/g for thorium-230 was exceeded in the South Dump to a maximum depth of 1.2 m (4 ft).

Uranium was detected above 60 pCi/g at maximum depths of 1 m (3 ft) in the South Dump and at greater than 1 m (3 ft) in Ash Pond. Uranium concentrations of 15 pCi/g were detected to a maximum depth of 1.2 m (4 ft) in the South Dump and to a maximum depth of greater than 1 m (3 ft) in Ash Pond. In addition, of 217 boreholes drilled at the site, samples from only two boreholes drilled in the area of the proposed isolation system had radium-226 concentrations above the near-surface soil guideline of 5 pCi/g. A sample from the borehole located east of Ash Pond had elevated radium concentrations to a depth of 0.8 m (2.5 ft), with a maximum of 5.6 pCi/g at a depth of 0.3 m (1 ft). A sample from the borehole located in the South Dump was contaminated to 1 m (3 ft) below the ground surface, with a maximum concentration of 37.5 pCi/g at a depth of 0.3 m (1 ft) (Marutzky et al. 1988).

For comparative purposes, 9 boreholes were drilled off-site to establish background concentrations of radionuclides. The sampling locations (A, B, C, and 1 through 6) are shown in Fig. 7, and the analytical results are summarized in Table 2.

THREAT TO PUBLIC HEALTH AND THE ENVIRONMENT

A potential health and environmental hazard exists at the Weldon Spring site due to high levels of uranium in the outflow from the Ash Pond area. The contamination poses a similar hazard off-site because at least a portion of this outflow, which enters the subsurface just west of the site boundary, surfaces again at Burgermeister Spring in the Busch Wildlife Area. Lake 35 in the wildlife area also receives surface water directly from Ash Pond (MK-Ferguson and Jacobs Engineering 1987). Contamination of Lake 35 and Burgermeister Spring poses a potential health hazard to area personnel, the general public, and resident wildlife.

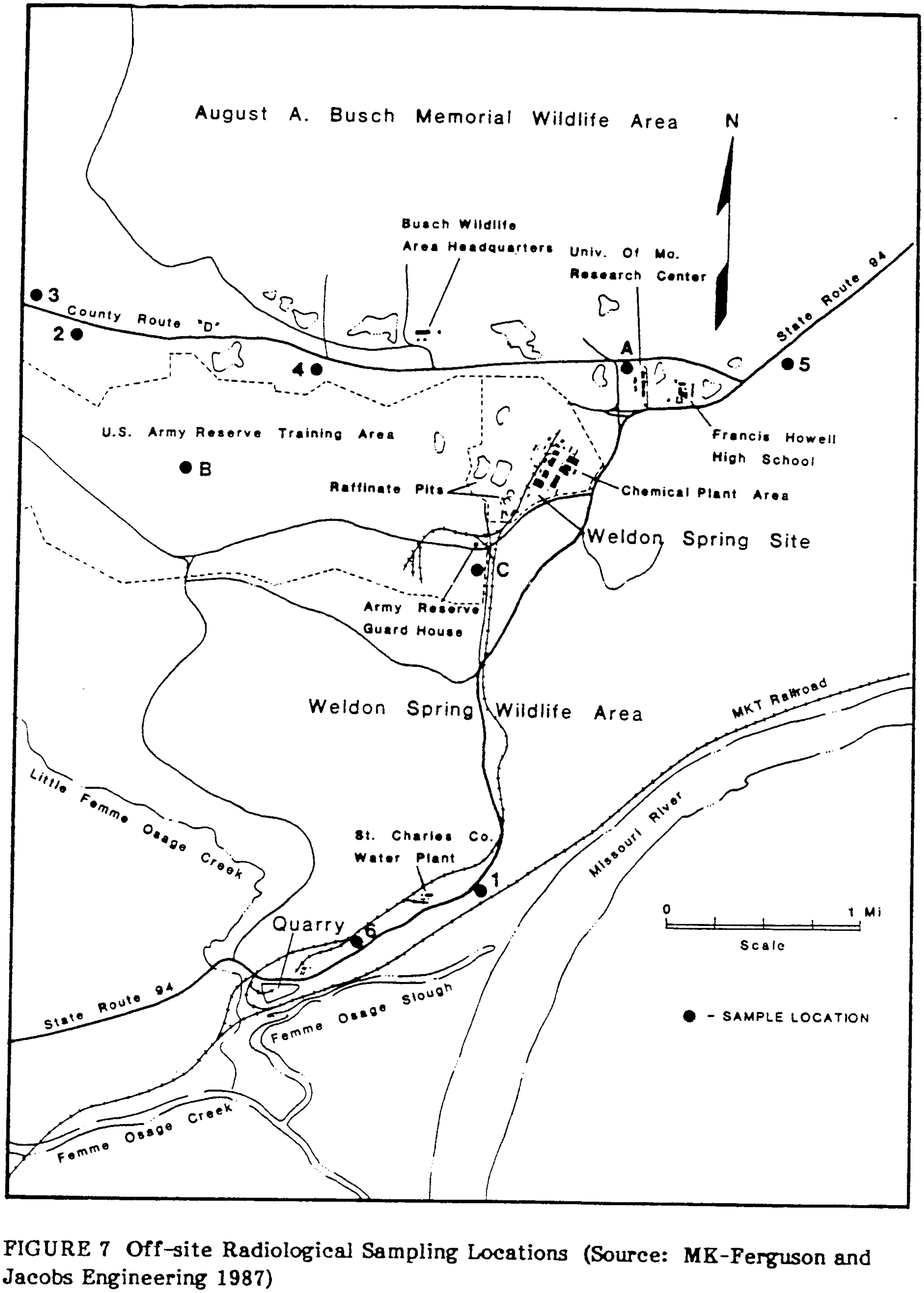

FIGURE 7 Off-site Radiological Sampling Locations (Source: MK-Ferguson and Jacobs Engineering 1987)

TABLE 2 **Background Concentrations of Radionuclides in Surface Soil**

Off-site Location[a]	Concentration (pCi/g)		
	Radium-226	Thorium-232	Uranium-238
1	0.8	0.9	< DL[b]
2	1.1	0.9	< DL
3	1.3	0.6	< DL
4	0.8	0.8	< DL
5	0.9	1.0	< DL
6	1.1	1.0	< DL
A	0.9	0.7	< DL
B	0.5	1.2	< DL
C	1.2	0.4	< DL

[a]Samples from locations 1-6 were composited over 15 cm (6 in.); samples from locations A-C were composited over 1 m (3 ft).

[b]DL = detection limit (about 1.9 pCi/g).

Source: Data from MK-Ferguson and Jacobs Engineering (1987).

RESPONSE ACTION

Response Action Objectives

The objectives of the proposed response action are as follows:

1. Reduction of the potential on-site health hazard due to uranium contamination of surface water in the Ash Pond area;

2. Reduction of the potential off-site health hazard due to uranium contamination of receiving waters in the Busch Wildlife Area;

3. Reduction of the surface water infiltration rate through contaminated soils in the Ash Pond area; and

4. Improvement in the quality of water being discharged off-site from the Ash Pond area.

These objectives can be met by limiting surface water flow through the contaminated Ash Pond area by means of the proposed isolation system.

Proposed Response Action Alternatives

Interim (expedited) response actions are implemented to ensure the health and safety of on-site personnel and local populations and to minimize or preclude off-site releases of contamination. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act (SARA), and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., actions will be limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

The following alternatives have been identified for the proposed interim response action to reduce contamination of surface runoff from the Ash Pond area:

1. No action;

2. Excavation of contaminated material from the Ash Pond area, including the South Dump, which is responsible for radiological contamination of surface flow through the area, with on-site storage of all material that exceeds the radiological criteria for unrestricted release (and on-site interim storage of any material that exceeds limits for chemical contamination, if discovered, pending a disposal decision);

3. Construction of a dike at the site boundary downstream of the Ash Pond area to provide a retention basin for the contaminated water until it can be decontaminated at an on-site water treatment plant; and

4. Construction of an isolation dike upstream of Ash Pond to prevent contact of surface runoff with contaminated material in the Ash Pond area (e.g., the South Dump) and construction of diversion channels to route the water away from these contaminated locations for subsequent outflow at its current off-site discharge point.

Screening and Analysis of Response Action Alternatives

The four alternatives that have been identified for the proposed action are screened and analyzed below on the basis of criteria identified in U.S. Environmental Protection Agency (EPA) guidance for removal actions. These criteria include technical feasibility, environmental impacts, cost, and institutional factors (e.g., timeliness, compliance with ARARs, and protectiveness of public health and welfare).

If no action were taken (Alternative 1), the potential health threat posed by uranium contamination of surface runoff from Ash Pond would not be reduced, nor would on-site or off-site environmental conditions be improved. Although Alternative 1 presents no technical barriers and costs nothing in the short term, it is effectively precluded by the potential for adverse environmental impacts and significant long-term costs (e.g., for the cleanup of areas not currently contaminated but to which contaminants may migrate if no action is taken). It is also precluded by institutional factors related to the community's desire for timely response actions at the Weldon Spring site -- in particular, for a reduction in the off-site release of contaminants.

The action alternatives (Alternatives 2 through 4) are technically feasible and would reduce the potential hazards associated with uranium contamination of surface runoff. Environmental conditions, both on-site and off-site, would be improved if any of these alternatives were implemented.

Alternative 2 is expected to be more expensive than Alternatives 3 and 4. The affected area would need to be protected from surface water intrusion during the excavation period, which would be reflected in costs for constructing an isolation system. In addition to these construction costs, which would be similar to those for Alternatives 3 and 4, Alternative 2 would incur costs associated with storage -- i.e., for all material exceeding radiological release criteria and for chemically contaminated material, if encountered, pending a disposal decision. Thus, a material staging area would be required for Alternative 2; the plan for such a staging area is currently being addressed as a separate interim response action because of a separately identified need. The more extensive planning and documentation that would be required prior to the implementation of Alternative 2, because of its expanded scope as compared to Alternatives 3 and 4, would increase costs and delay the initiation of any mitigative action. Therefore, Alternative 2 would not satisfy institutional factors related to timeliness, i.e., the community's desire for expedited response with regard to minimizing off-site releases of radioactively contaminated water.

The excavation of contaminated material from the area of the proposed interim response action is not unique to Alternative 2; it is being addressed in remedial action plans for the Weldon Spring site and would occur subsequent to the implementation of either Alternative 3 or 4. The excavation would likely be included in the scope of the record of decision for remedial action at the Weldon Spring site. Thus, the selection of either Alternative 3 or Alternative 4 would preclude the need for interim storage of contaminated material because a decision on waste disposal would have been made by the time of excavation. An additional advantage of selecting Alternative 3 or Alternative 4 instead of Alternative 2 is the flexibility to initiate a timely response action at the Ash Pond area, without being tied to a decision that is within the broader scope of overall remedial action for the Weldon Spring site.

Although implementation of Alternative 3 would prevent surface water from leaving the Ash Pond area (i.e., by virtue of a downstream dike), it would do nothing to mitigate the contamination of this water (i.e., the contact of inflow with contaminated materials would continue). Thus, a water treatment plant would be required to treat the contaminated water prior to its release off-site. Costs associated with the construction and operation of a water treatment plant would make Alternative 3 more expensive than Alternative 4. In addition, institutional factors associated with public pressure to minimize off-site contaminant releases would not be completely addressed by Alternative 3. Ponding of water above areas of contaminated soil would increase the local hydraulic head, thereby increasing the potential for infiltration through these areas and the resultant transport of radionuclides into the groundwater. Finally, Alternative 3 would be unsatisfactory in terms of timeliness and other institutional factors related to construction of the water treatment plant. Because approval for this construction has not yet been addressed by the appropriate federal, state, or local agencies, considerable delays could occur prior to construction of the treatment plant.

In contrast to Alternative 3, Alternative 4 would involve diversion of surface runoff away from contaminated areas in the watershed. Not only would this preclude the contamination of surface runoff resulting from contact with these areas and obviate the need for a water treatment plant, it would also effectively reduce the hydraulic head at Ash Pond, thereby decreasing the potential for contaminant transport into the groundwater. Alternative 4 could be implemented in a timely and cost-effective manner and would be protective of the public and the environment by limiting the off-site release of contaminants.

As a result of the screening and analysis process for interim response action alternatives, Alternative 4 has been identified as the preferred alternative. Alternative 4 is consistent with and will contribute to the efficient performance of remedial action being planned for the Weldon Spring site.

Description of the Proposed Response Action

Implementation of the proposed interim response action to construct an upstream dike and diversion channels would result in restricting the flow of surface water across the contaminated areas of the Ash Pond watershed. The response action would include the following operations:

1. Construction of an isolation dike upstream of Ash Pond -- measuring approximately 230 m (750 ft) in length and 3 m (10 ft) at its maximum height, containing about 5,400 m^3 (7,000 yd^3) of uncontaminated soil material, and creating a retention pond covering a maximum of 0.6 ha (1.5 acres) when full;

2. Construction of diversion channels totaling approximately 610 m (2,500 ft) in length and measuring about 1 m (3 ft) in height, which would circumvent the Ash Pond area and connect the dike to the current point of surface water discharge off-site; and

3. Maintenance of the discharge monitoring station currently in place for intermittent measurement of water quality and continuous measurement of the quantity of surface water discharged from the Ash Pond area.

The proposed action would be conducted in accordance with all applicable or relevant and appropriate requirements (ARARs), to ensure protection of the safety and health of on-site workers and local populations and to limit off-site releases of contaminants. Section 121(d)(4) of SARA identifies six conditions under which a waiver from compliance with ARARs may be granted. One of these conditions is that the action is only part of a total remedial action that will attain such levels or standards of control as identified by the specific ARAR when the total remedial action is completed. If it is determined that a waiver application is necessary, e.g., for uranium discharge limits, this condition is applicable to the proposed interim response action because isolation of the Ash Pond area is by definition an interim measure to minimize the off-site migration of contaminants. It is also important to note that, because the proposed action is an interim measure, the effected reduction in the uranium discharge level is not to be interpreted as an accepted discharge limit for the remedial action project at the Weldon Spring site. Instead, this level is specific to the response action and is dictated by the conditions of that intermediate action, the purpose of which is to improve near-term environmental and safety conditions in the Ash Pond area. The DOE will establish project-specific discharge limits and cleanup criteria for the Weldon Spring site in cooperation with the EPA and the Missouri Department of Natural Resources.

Borrow material for construction of the Ash Pond isolation dike and diversion channels would be obtained from a nearby spoils pile located outside the affected area. Results of characterization studies have indicated that this spoils pile poses no chemical hazard and is not radiologically contaminated.

This interim response action would be taken to reduce the concentration of uranium in water leaving the Ash Pond watershed. It is expected that the uranium concentration would be reduced from as high as 4,000 pCi/L to less than 400 pCi/L, which is below the current DOE uranium-238 limit of 600 pCi/L for release to uncontrolled areas (U.S. Department of Energy 1986). The isolated areas responsible for this contamination (i.e., locations in the Ash Pond area, including the South Dump) would be remediated in the future. Implementation of the proposed response action at this time would minimize the potential adverse impacts on health and the environment resulting from continued runoff of highly contaminated surface water from the watershed and would support the long-term response to contaminated conditions in the Ash Pond area.

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APPENDIX A

DOE GUIDELINES FOR RESIDUAL RADIOACTIVE MATERIAL

U.S. DEPARTMENT OF ENERGY GUIDELINES
FOR RESIDUAL RADIOACTIVE MATERIAL AT
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM
AND
REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

(Revision 2, March 1987)

A. INTRODUCTION

This document presents U.S. Department of Energy (DOE) radiological protection guidelines for cleanup of residual radioactive material and management of the resulting wastes and residues. It is applicable to sites identified by the Formerly Utilized Sites Remedial Action Program (FUSRAP) and remote sites identified by the Surplus Facilities Management Program (SFMP).* The topics covered are basic dose limits, guidelines and authorized limits for allowable levels of residual radioactive material, and requirements for control of the radioactive wastes and residues.

Protocols for identification, characterization, and designation of FUSRAP sites for remedial action; for implementation of the remedial action; and for certification of a FUSRAP site for release for unrestricted use are given in a separate document (U.S. Department of Energy 1986) and subsequent guidance. More detailed information on applications of the guidelines presented herein, including procedures for deriving site-specific guidelines for allowable levels of residual radioactive material from basic dose limits, is contained in "A Manual for Implementing Residual Radioactive Material Guidelines" (U.S. Department of Energy 1987), referred to herein as the "supplement".

"Residual radioactive material" is used in these guidelines to describe radioactive material derived from operations or sites over which DOE has authority. Guidelines or guidance to limit the levels of radioactive material and to protect the public and the environment are provided for (1) residual concentrations of radionuclides in soil,** (2) concentrations of airborne

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*A remote SFMP site is one that is excess to DOE programmatic needs and is located outside a major operating DOE research and development or production area.

**"Soil" is defined herein as unconsolidated earth material, including rubble and debris that may be present in earth material.

radon decay products, (3) external gamma radiation levels, (4) surface contamination levels, and (5) radionuclide concentrations in air or water resulting from or associated with any of the above.

A "basic dose limit" is a prescribed standard from which limits for quantities that can be monitored and controlled are derived; it is specified in terms of the effective dose equivalent as defined by the International Commission on Radiological Protection (ICRP 1977, 1978). The basic dose limits are used for deriving guidelines for residual concentrations of radionuclides in soil. Guidelines for residual concentrations of thorium and radium in soil, concentrations of airborne radon decay products, allowable indoor external gamma radiation levels, and residual surface contamination concentrations are based on existing radiological protection standards (U.S. Environmental Protection Agency 1983; U.S. Nuclear Regulatory Commission 1982; and DOE Departmental Orders). Derived guidelines or limits based on the basic dose limits for those quantities are used only when the guidelines provided in the existing standards cited above are shown to be inappropriate.

A "guideline" for residual radioactive material is a level of radioactivity or radioactive material that is acceptable if use of the site is to be unrestricted. Guidelines for residual radioactive material presented herein are of two kinds: (1) generic, site-independent guidelines taken from existing radiation protection standards and (2) site-specific guidelines derived from basic dose limits using site-specific models and data. Generic guideline values are presented in this document. Procedures and data for deriving site-specific guideline values are given in the supplement. The basis for the guidelines is generally a presumed worst-case plausible-use scenario for the site.

An "authorized limit" is a level of residual radioactive material or radioactivity that must not be exceeded if the remedial action is to be considered completed and the site is to be released for unrestricted use. The authorized limits for a site will include (1) limits for each radionuclide or group of radionuclides, as appropriate, associated with residual radioactive material in soil or in surface contamination of structures and equipment, (2) limits for each radionuclide or group of radionuclides, as appropriate, in air or water, and, (3) where appropriate, a limit on external gamma radiation resulting from the residual material. Under normal circumstances, expected to occur at most sites, authorized limits for residual radioactive material or radioactivity are set equal to guideline values. Exceptional conditions for which authorized limits might differ from guideline values are specified in Sections D and F of this document. A site may be released for unrestricted use only if site conditions do not exceed the authorized limits or approved supplemental limits, as defined in Section F.1, at the time remedial action is completed. Restrictions and controls on use of the site must be established and enforced if site conditions exceed the approved limits, or if there is potential to exceed the basic dose limit if use of the site is not restricted (Section F.2). The applicable controls and restrictions are specified in Section E.

DOE policy requires that all exposures to radiation be limited to levels that are as low as reasonably achievable (ALARA). For sites to be released for unrestricted use, the intent is to reduce residual radioactive material to levels that are as far below authorized limits as reasonable considering technical, economic, and social factors. At sites where the residual material is not reduced to levels that permit release for unrestricted use, ALARA policy is implemented by establishing controls to reduce exposure to levels that are as low as reasonably achievable. Procedures for implementing ALARA policy are discussed in the supplement. ALARA policies, procedures, and actions shall be documented and filed as a permanent record upon completion of remedial action at a site.

B. BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 100 mrem/yr. The internal committed effective dose equivalent, as defined in ICRP Publication 26 (ICRP 1977) and calculated by dosimetry models described in ICRP Publication 30 (ICRP 1978), plus the dose from penetrating radiation sources external to the body, shall be used for determining the dose. This dose shall be described as the "effective dose equivalent". Every effort shall be made to ensure that actual doses to the public are as far below the basic dose limit as is reasonably achievable.

Under unusual circumstances, it will be permissible to allow potential doses to exceed 100 mrem/yr where such exposures are based upon scenarios that do not persist for long periods and where the annual lifetime exposure to an individual from the subject residual radioactive material would be expected to be less than 100 mrem/yr. Examples of such situations include conditions that might exist at a site scheduled for remediation in the near future or a possible, but improbable, one-time scenario that might occur following remedial action. These levels should represent doses that are as low as reasonably achievable for the site. Further, no annual exposure should exceed 500 mrem.

C. GUIDELINES FOR RESIDUAL RADIOACTIVE MATERIAL

C.1 Residual Radionuclides in Soil

Residual concentrations of radionuclides in soil shall be specified as above-background concentrations averaged over an area of 100 m^2. Generic guidelines for thorium and radium are specified below. Guidelines for residual concentrations of other radionuclides shall be derived from the basic dose limits by means of an environmental pathway analysis using site-specific data where available. Procedures for these derivations are given in the supplement.

If the average concentration in any surface or below-surface area less than or equal to 25 m^2 exceeds the authorized limit or guideline by a factor of $(100/A)^{1/2}$, where A is the area of the elevated region in square meters, limits for "hot spots" shall also be applicable. Procedures for calculating these hot spot limits, which depend on the extent of the elevated local concentrations, are given in the supplement. In addition, every reasonable effort shall be made to remove any source of radionuclide that exceeds 30 times the appropriate limit for soil, irrespective of the average concentration in the soil.

Two types of guidelines are provided, generic and derived. The generic guidelines for residual concentrations of Ra-226, Ra-228, Th-230, and Th-232 are:

- 5 pCi/g, averaged over the first 15 cm of soil below the surface

- 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface

These guidelines take into account ingrowth of Ra-226 from Th-230 and of Ra-228 from Th-232, and assume secular equilibrium. If either Th-230 and Ra-226 or Th-232 and Ra-228 are both present, not in secular equilibrium, the appropriate guideline is applied as a limit to the radionuclide with the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that (1) the dose for the mixtures will not exceed the basic dose limit or (2) the sum of the ratios of the soil concentration of each radionuclide to the allowable limit for that radionuclide will not exceed 1 ("unity"). Explicit formulas for calculating residual concentration guidelines for mixtures are given in the supplement.

C.2 Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that are intended for unrestricted use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR Part 192) is: In any occupied or habitable building, the objective of remedial action shall be, and a reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL.* In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions by DOE are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive material is not the cause.

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*A working level (WL) is any combination of short-lived radon decay products in one liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy.

C.3 External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site to be released for unrestricted use shall not exceed the background level by more than 20 μR/h and shall comply with the basic dose limit when an appropriate-use scenario is considered. This requirement shall not necessarily apply to structures scheduled for demolition or to buried foundations. External gamma radiation levels on open lands shall also comply with the basic dose limit, considering an appropriate-use scenario for the area.

C.4 Surface Contamination

The generic surface contamination guidelines provided in Table 1 are applicable to existing structures and equipment. These guidelines are adapted from standards of the U.S. Nuclear Regulatory Commission (NRC 1982)* and will be applied in a manner that provides a level of protection consistent with the Commission's guidance. These limits apply to both interior and exterior surfaces. They are not directly intended for use on structures to be demolished or buried, but should be applied to equipment or building components that are potentially salvageable or recoverable scrap. If a building is demolished, the guidelines in Section C.1 are applicable to the resulting contamination in the ground.

C.5 Residual Radionuclides in Air and Water

Residual concentrations of radionuclides in air and water shall be controlled to levels required by DOE Environmental Protection Guidance and Orders, specifically DOE Order 5480.1A and subsequent guidance. Other Federal and/or state standards shall apply when they are determined to be appropriate.

D. AUTHORIZED LIMITS FOR RESIDUAL RADIOACTIVE MATERIAL

Authorized limits shall be established to (1) ensure that, as a minimum, the basic dose limits specified in Section B will not be exceeded under the worst-case plausible-use scenario consistent with the procedures and guidance provided or (2) be consistent with applicable generic guidelines, where such guidelines are provided. The authorized limits for each site and its vicinity properties shall be set equal to the generic or derived guidelines except where it can be clearly established on the basis of site-specific data -- including health, safety, and socioeconomic considerations -- that the guidelines are not appropriate for use at the specific site. Consideration should also be given to ensure that the limits comply with or provide a level of protection equivalent to other appropriate limits and guidelines (i.e., state or

*These guidelines are functionally equivalent to Section 4 -- Decontamination for Release for Unrestricted Use -- of NRC Regulatory Guide 1.86 (U.S. Atomic Energy Commission 1974), but they are applicable to non-reactor facilities.

TABLE 1 SURFACE CONTAMINATION GUIDELINES

Radionuclides[b]	Allowable Total Residual Surface Contamination (dpm/100 cm^2)[a]		
	Average[c,d]	Maximum[d,e]	Removable[d,f]
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 β-γ	15,000 β-γ	1,000 β-γ

[a] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[b] Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

[c] Measurements of average contamination should not be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.

[d] The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

[e] The maximum contamination level applies to an area of not more than 100 cm^2.

[f] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

other Federal). Documentation supporting such a decision should be similar to that required for supplemental limits and exceptions (Section F), but should be generally more detailed because the documentation covers the entire site.

Remedial action shall not be considered complete unless the residual radioactive material levels comply with the authorized limits. The only exception to this requirement will be for those special situations where the supplemental limits or exceptions are applicable and approved as specified in Section F. However, the use of supplemental limits and exceptions should be considered only if it is clearly demonstrated that it is not reasonable to decontaminate the area to the authorized limit or guideline value. The authorized limits are developed through the project offices in the field and are approved by the headquarters program office.

E. CONTROL OF RESIDUAL RADIOACTIVE MATERIAL AT FUSRAP AND REMOTE SFMP SITES

Residual radioactive material above the guidelines at FUSRAP and remote SFMP sites must be managed in accordance with applicable DOE Orders. The DOE Order 5480.1A and subsequent guidance or superceding Orders require compliance with applicable Federal and state environmental protection standards.

The operational and control requirements specified in the following DOE Orders shall apply to interim storage, interim management, and long-term management.

a. 5000.3, Unusual Occurrence Reporting System

b. 5440.1C, Implementation of the National Environmental Policy Act

c. 5480.1A, Environmental Protection, Safety, and Health Protection Program for DOE Operations, as revised by DOE 5480.1 change orders and the 5 August 1985 memorandum from Vaughan to Distribution

d. 5480.2, Hazardous and Radioactive Mixed Waste Management

e. 5480.4, Environmental Protection, Safety, and Health Protection Standards

f. 5482.1A, Environmental, Safety, and Health Appraisal Program

g. 5483.1A, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities

h. 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements

i. 5820.2, Radioactive Waste Management

E.1 Interim Storage

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years.

b. Above-background Rn-222 concentrations in the atmosphere above facility surfaces or openings shall not exceed (1) 100 pCi/L at any given point, (2) an annual average concentration of 30 pCi/L over the facility site, and (3) an annual average concentration of 3 pCi/L at or above any location outside the facility site (DOE Order 5480.1A, Attachment XI-1).

c. Concentrations of radionuclides in the groundwater or quantities of residual radioactive material shall not exceed existing Federal or state standards.

d. Access to a site shall be controlled and misuse of on-site material contaminated by residual radioactive material shall be prevented through appropriate administrative controls and physical barriers -- active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These control features should be designed to ensure, to the extent reasonable, an effective life of at least 25 years. The Federal government shall have title to the property or shall have a long-term lease for exclusive use.

E.2 Interim Management

a. A site may be released under interim management when the residual radioactive material exceeds guideline values if the residual radioactive material is in inaccessible locations and would be unreasonably costly to remove, provided that administrative controls are established to ensure that no member of the public shall receive a radiation dose exceeding the basic dose limit.

b. The administrative controls, as approved by DOE, shall include but not be limited to periodic monitoring as appropriate, appropriate shielding, physical barriers to prevent access, and appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactive material or cause it to migrate.

c. The owner of the site or appropriate Federal, state, or local authorities shall be responsible for enforcing the administrative controls.

E.3 Long-Term Management

Uranium, Thorium, and Their Decay Products

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years.

b. Control and stabilization features shall be designed to ensure that Rn-222 emanation to the atmosphere from the wastes shall not (1) exceed an annual average release rate of 20 pCi/m^2/s and (2) increase the annual average Rn-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L. Field verification of emanation rates is not required.

c. Prior to placement of any potentially biodegradable contaminated wastes in a long-term management facility, such wastes shall be properly conditioned to ensure that (1) the generation and escape of biogenic gases will not cause the requirement in paragraph b. of this section (E.3) to be exceeded and (2) biodegradation within the facility will not result in premature structural failure in violation of the requirements in paragraph a. of this section (E.3).

d. Groundwater shall be protected in accordance with appropriate Departmental Orders and Federal and state standards, as applicable to FUSRAP and remote SFMP sites.

e. Access to a site should be controlled and misuse of on-site material contaminated by residual radioactivity should be prevented through appropriate administrative controls and physical barriers -- active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These controls should be designed to be effective to the extent reasonable for at least 200 years. The Federal government shall have title to the property.

Other Radionuclides

f. Long-term management of other radionuclides shall be in accordance with Chapters 2, 3, and 5 of DOE Order 5820.2, as applicable.

F. SUPPLEMENTAL LIMITS AND EXCEPTIONS

If special site-specific circumstances indicate that the guidelines or authorized limits established for a given site are not appropriate for a portion of that site or for a vicinity property, then the field office may request that supplemental limits or an exception be applied. In either case, the field office must justify that the subject guidelines or authorized limits are not appropriate and that the alternative action will provide adequate protection, giving due consideration to health and safety, the environment, and costs. The field office shall obtain approval for specific supplemental limits or exceptions from headquarters as specified in Section D of these guidelines and shall provide to headquarters those materials required for the justification as specified in this section (F) and in the FUSRAP and SFMP protocols and subsequent guidance documents. The field office shall also be responsible for coordination with the state or local government of the limits or exceptions and associated restrictions as appropriate. In the case of exceptions, the field office shall also work with the state and/or local governments to ensure that restrictions or conditions of release are adequate and mechanisms are in place for their enforcement.

F.1 Supplemental Limits

The supplemental limits must achieve the basic dose limits set forth in this guideline document for both current and potential unrestricted uses of a site and/or vicinity property. Supplemental limits may be applied to a vicinity property or a portion of a site if, on the basis of a site-specific analysis, it is determined that (1) certain aspects of the vicinity property or portion of the site were not considered in the development of the established authorized limits and associated guidelines for that vicinity property or site and, (2) as a result of these unique characteristics, the established limits or guidelines either do not provide adequate protection or are unnecessarily restrictive and costly.

F.2 Exceptions

Exceptions to the authorized limits defined for unrestricted use of a site or vicinity property may be applied to a vicinity property or a portion of a site when it is established that the authorized limits cannot be achieved and restrictions on use of the vicinity property or portion of the site are necessary to provide adequate protection of the public and the environment. The field office must clearly demonstrate that the exception is necessary and that the restrictions will provide the necessary degree of protection and will comply with the requirements for control of residual radioactive material as set forth in Section E of these guidelines.

F.3 Justification for Supplemental Limits and Exceptions

Supplemental limits and exceptions must be justified by the field office on a case-by-case basis using site-specific data. Every effort should be made to minimize use of the supplemental limits and exceptions. Examples of specific situations that warrant use of the supplemental standards and exceptions are:

a. Where remedial action would pose a clear and present risk of injury to workers or members of the general public, notwithstanding reasonable measures to avoid or reduce risk.

b. Where remedial action -- even after all reasonable mitigative measures have been taken -- would produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near affected sites, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

c. Where it is clear that the scenarios or assumptions used to establish the authorized limits do not, under plausible current or future conditions, apply to the property or portion of the site identified and where more appropriate scenarios or assumptions indicate that other limits are applicable or necessary for protection of the public and the environment.

d. Where the cost of remedial action for contaminated soil is unreasonably high relative to long-term benefits and where the residual radioactive material does not pose a clear present or future risk after taking necessary control measures. The likelihood that buildings will be erected or that people will spend long periods of time at such a site should be considered in evaluating this risk. Remedial action will generally not be necessary where only minor quantities of residual radioactive material are involved or where residual radioactive material occurs in an inaccessible location at which site-specific factors limit their hazard and from which they are costly or difficult to remove. Examples include residual radioactive material under hard-surface public roads and sidewalks, around public sewer lines, or in fence-post foundations. A site-specific analysis must be provided to establish that it would not cause an individual to receive a radiation dose in excess of the basic dose limits stated in Section B, and a statement specifying the level of residual radioactive material must be included in the appropriate state and local records.

e. Where there is no feasible remedial action.

G. SOURCES

Limit or Guideline	Source
Basic Dose Limits	
Dosimetry model and dose limits	International Commission on Radiological Protection (1977, 1978)
Generic Guidelines for Residual Radioactivity	
Residual concentrations of radium and thorium in soil	40 CFR Part 192
Airborne radon decay products	40 CFR Part 192
External gamma radiation	40 CFR Part 192
Surface contamination	Adapted from U.S. Nuclear Regulatory Commission (1982)
Control of Radioactive Wastes and Residues	
Interim storage	DOE Order 5480.1A and subsequent guidance
Long-term management	DOE Order 5480.1A and subsequent guidance; 40 CFR Part 192; DOE Order 5820.2

H. REFERENCES

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IRA-200-204

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

R. Nelson
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PEER

JUL 28 1988

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. ~~Nelson~~ Rod:

We have reviewed the revised interim response action proposal for construction of an isolation system at the Ash Pond. In general, the revised document is sufficiently responsive to the comments we provided on the original submission. However, there are some remaining deficiencies in the area of conceptual design that make it difficult for us to assure that the dike system will be properly engineered for the site-specific conditions, and will meet the response action objectives. Our specific concerns are outlined below.

- Design criteria on the retention capacity of the Ash Pond isolation dike should have been presented. In particular, the dike should be designed to retain surface run-off from a defined storm event.

- The conceptual design should include a detailed description of the discharge monitoring system to evaluate the quality of water leaving the site.

In addition, the plan should have provided more detailed information on erosion control during and after construction of the proposed dike, and an abatement protocol in the event erosion occurs following seeding of exposed surfaces. Also, the plan should have addressed how the action might impact remedial investigation activities such as the chemical soil sampling investigation.

In summary, the revised document is sufficiently responsive to our comments; however, we would appreciate the opportunity to review the design criteria prior to letting a contract for construction.

DOCUMENT NUMBER: I-200-204-1.01

Thank you for the opportunity to comment on the proposal. Please call if you have any questions.

Sincerely yours,

Katie

B. Katherine Biggs
Chief, Environmental Review Branch

cc: Dave Bedan, MDNR

IRA-200-205

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE ARFS FILE # IR-0300

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The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

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IRA-300-302

DOE/OR/21548-026

United States Department Of Energy

CHEMICAL CHARACTERIZATION REPORT IRA #13 ARMY RESERVE PROPERTY VICINITY PROPERTIES NO. 1, 2, 3 AND 7

REV. 0

DECEMBER 2, 1987

WELDON SPRING SITE REMEDIAL ACTION PROJECT

CHEMICAL CHARACTERIZATION REPORT

IRA #13

ARMY RESERVE PROPERTY VICINITY PROPERTIES

NO. 1, 2, 3 AND 7

PREPARED FOR:

U.S. DEPARTMENT OF ENERGY

OAK RIDGE OPERATIONS OFFICE

UNDER CONTRACT NO. DE-AC05-860R21548

PREPARED BY:

MK-FERGUSON COMPANY

AND

JACOBS ENGINEERING GROUP, INC.

ROUTE 2, HIGHWAY 94 SOUTH

ST. CHARLES, MISSOURI 63303

DECEMBER 2, 1987

TABLE OF CONTENTS

1.0 INTRODUCTION

This report presents the analytical results of chemical sampling from radiologically contaminated areas on the U.S. Army Weldon Spring Training Area. The sampling was designed to supply chemical constituent information for these properties so remedial action plans could be addressed. A brief summary is provided for background knowledge of site conditions.

The Weldon Spring Site (WSS) is located on State Highway 94, southwest of St. Charles, Missouri. Adjacent to this site is the U.S. Army Reserve Property now referred to as the Weldon Spring Training Area (WSTA). This is a fenced area covering approximately 746 hectares (Ha). Portions of the WSTA are cleared and easily accessible, while other sections are wooded or overgrown with heavy brush. An extensive system of drainage ditches exists on the property. The site contains numerous paved and unpaved roads, several inactive rail lines, a few ponds, and numerous small buildings. Remnants of rail lines and buildings, previously associated with ordnance manufacturing operations, remain on the WSTA.

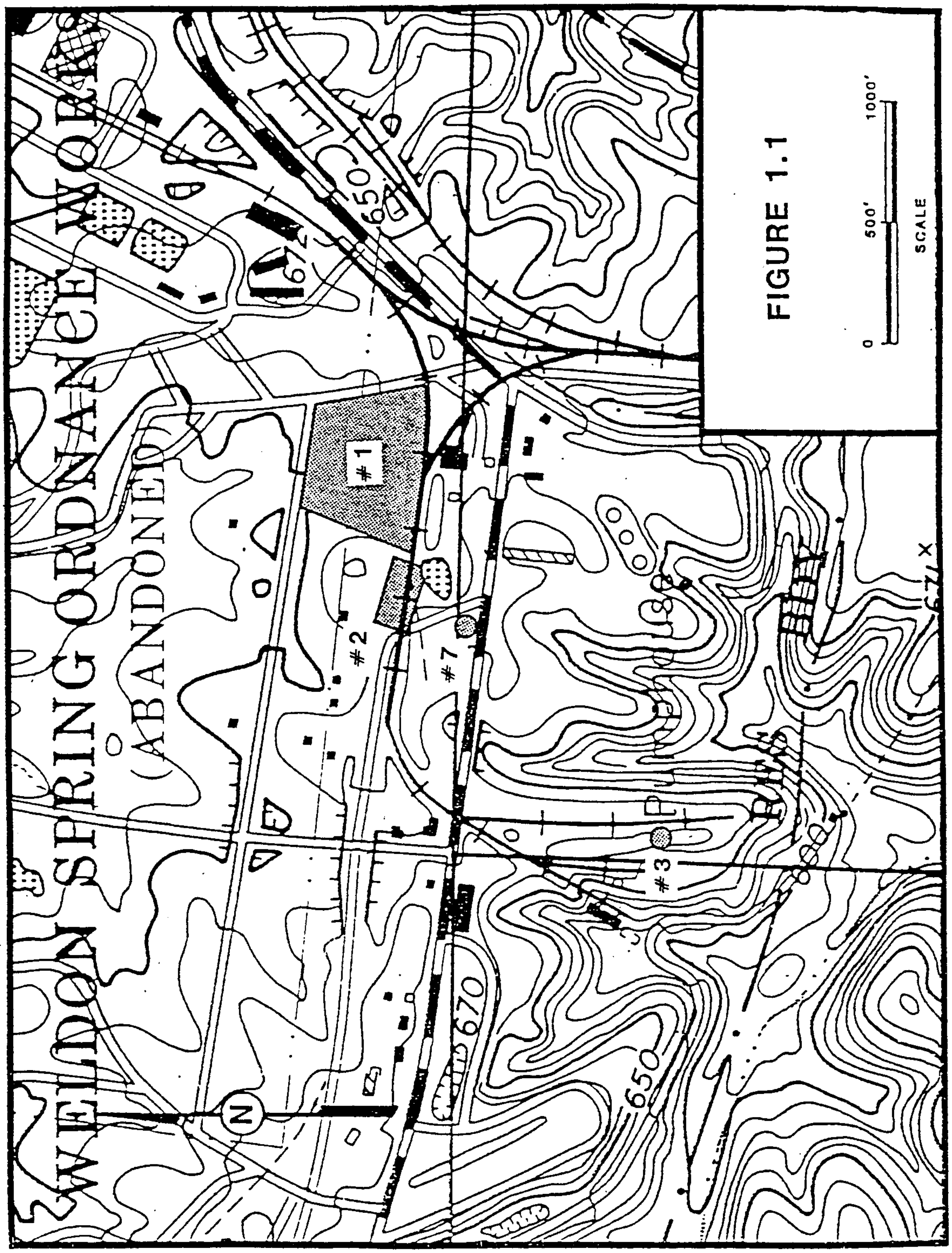
During World War II, the U.S. Army acquired approximately 17000 acres of the Weldon Spring Area for the production of explosives. Up to twenty production lines were operated at the Weldon Spring Ordnance Works (WSOW) during this period. The WSOW was declared surplus after World War II and 15000 of the original 17000 acres were conveyed as surplus property to various parties. Two hundred and five (205) acres were transferred to the U.S. Atomic Energy Commission (AEC) for use as an Uranium Feed Materials Plant. The AEC plant operated from 1957 to 1967.

In 1967, the AEC closed the plant. The AEC transferred the property back to the Army which placed the facility in a caretaker mode until 1985. Custody was transferred back to the Department of Energy, the successor to the AEC, and the Weldon Spring Site Remedial Action Project (WSSRAP) was designated to remediate and dispose of the waste associated with the Feed Materials Plant.

A radiological survey of the WSTA was performed by Oak Ridge Associated Universities (ORAU) during March - July, 1985. The methods and procedures utilized in that survey are presented in a report prepared by ORAU (ORAU, 1986). The ORAU report identified seven (7) locations, hereinafter referred to as vicinity properties, on the WSTA. These seven (7) vicinity properties were identified by the presence of uranium, radium, and thorium contamination from former uranium processing operations at the Weldon Spring Site (WSS). This report addresses Vicinity Properties No. 1, 2, 3, and 7.

In June - August, 1987 these vicinity properties were resurveyed for the WSSRAP to determine the extent of radiological contamination and to delineate excavation depths. This second survey was performed in order to determine the appropriate remedial action effort necessary to remove the radiological contaminants associated with the former uranium processing plant from the vicinity properties. In addition, soil samples were collected for subsequent chemical analyses.

Section 3.0 of this report lists the analytical parameters for each Vicinity Property sample. The analytical parameters were chosen based on contaminants that exist or could potentially exist due to the WSS operational history. This analytical information will be used to determine the level of personnel protection required during remedial action and to obtain chemical constituent information about the radiologically contaminated material. The location of each Vicinity Property addressed in this report is shown in Figure 1.1. A detailed description of the history of operations at the WSS can be found in a report published by the Atomic Energy Commission (U.S.A.E.C., 1960).



LOCATION OF VICINITY PROPERTIES 1, 2, 3, AND 7

2.0 DESCRIPTION OF SAMPLES

Each of six composite samples were analyzed for various parameters which exist or have the potential to exist as contaminants from the WSOW or AEC operations. The samples were collected in areas where radiological contamination is known to be present. The purpose was to obtain chemical constituent information about the radiologically contaminated material that will be excavated and transported to the WSS for temporary storage. In addition, radiometric analyses for thorium-230 were performed to determine if this contaminant was present at levels affecting the quantities of material identified as above the residual soil guidelines for U-238 and Ra-226. Details concerning the boundaries and extent of radiological contamination are presented in separate reports prepared for each vicinity property (Ref. 2-5).

At Vicinity Property No.1, three (3) samples were analyzed. The three samples were equally weighted composites of aliquots from soil samples representing three zones of contamination. The zones of contamination were identified with respect to depth and location of radioactive contaminants. Samples used to form the composites were selected from different locations and depths within each zone. These three zones are identified as tracks, outer zone, and perimeter mixes.

The "tracks" sample is a composite of four (4) samples which were collected near a mound of radiologically contaminated soil and metal debris near the abandoned railroad tracks. The "outer zone" sample is a composite of six (6) samples, collected from an area outside the mound. The "perimeter" sample is a composite of five (5) samples, collected near the outer boundary of the radiologically contaminated region.

At Vicinity Property No. 2, one composite sample was analyzed from six (6) samples collected within the area of radiological contamination. Equally weighted aliquots of those six samples were composited into one representative sample for the volume of radiologically contaminated material which requires remedial action.

At Vicinity Property No. 3, one composite sample was analyzed from four (4) samples collected within the radiologically contaminated area. Equally weighted aliquots of those four samples were composited into one representative sample for the volume of radiologically contaminated material which requires remedial action.

Only thirty-five (35) square feet of material is radiologically contaminated at Vicinity Property No. 7, therefore only one soil sample location was analyzed representing the entire Vicinity Property.

3.0 RESULTS OF ANALYSES

All six samples were analyzed by an offsite independent laboratory subcontracted by the WSSRAP. All analyses for metals, PCB's and semi-volatiles were performed according to the Environmental Protection Agency - Contract Laboratory Program (EPA-CLP) Methods. Specific procedure details can be found in the EPA Contract Laboratory Program Test Methods Manual. All nitroaromatics were analyzed by procedures developed for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) and are referred to as the USATHAMA Method. Thorium-230 was analyzed by alpha spectroscopy according to methods developed by the EPA Eastern Environmental Radiation Facility (EERF 00/07). Individual results for each Vicinity Property location are found in Appendix A.

Concentrations of EPA-CLP Metals in soil have been studied for the environmental and geographical characteristics of this area. Elevated concentrations of some metals in soil are normal for this area and do not necessarily reflect contamination from WSOW or AEC operations. However, detectable quantities of PCB's, semi-volatiles, or nitroaromatics would be associated with those operations mentioned above and would be considered as contamination. A summary of the chemical contamination found are described below:

Vicinity Property No. 1: Tracks

The soil composite was analyzed for CLP-metals and nitroaromatics. The only elevated constituent above background concentrations was barium in the CLP-metals analysis. All other metals and nitroaromatics were at background concentrations or not detected. Radiometric results for thorium-230 were less than 1 pCi/g.

Vicinity Property No. 1: Outer Zone Mix

The soil composite was analyzed for CLP-metals, nitroaromatics, semi-volatiles, and PCB's. The only elevated constituent above background concentration was barium in the CLP-metals analysis. All other metals, nitroaromatics, semi-volatiles, and PCB's were at background concentrations or not detected. Radiometric results for thorium-230 were less than 1.0 pCi/g.

Vicinity Property No. 1: Perimeter

The soil composite was analyzed for CLP-metals and nitroaromatics. The constituents above background concentrations are barium, cobalt, and lead in the CLP-metal analysis. All other metals and nitroaromatics were at background concentrations or not detected. Radiometric results for thorium-230 were 2.4 pCi/g.

Vicinity Property No. 2

The soil composite was analyzed for CLP-metals, nitroaromatics, semi-volatiles, and PCB's. The constituents above background concentrations were barium, chromium, cobalt, lead, vanadium in the CLP-metals and 1,3-Dinitrobenzene in the nitroaromatics analysis. All other metals, nitroaromatics, semi-volatiles, and PCB's were at background concentrations or not detected. Radiometric results for thorium-230 were 2.9 pCi/g.

Vicinity Property No. 3

The soil composite was analyzed for CLP-metals and nitroaromatics. The only constituent above background concentration was lead in the CLP metals analysis. All other metals and nitroaromatics were at background concentrations or not detected. Radiometric results for thorium-230 were 2.2 pCi/g.

Vicinity Property No. 7

The soil composite was analyzed for CLP-metals, nitroaromatics, nitrates, sulfates, chlorides, and fluorides. The constituents above background concentrations were barium and lead in the CLP-metals analysis. All other metals, nitroaromatics, nitrates, sulfates, chlorides, and fluorides were at background concentrations or not detected. Radiometric results for thorium-230 were 12 pCi/g, which is about the same magnitude as Radium-226 concentrations. However, this concentration of Th-230 is not expected to affect the volume of material which requires remedial action.

4.0 CONCLUSION

The results of analyses indicated that a few select metals were above background concentrations at all locations. At Vicinity Property No. 2, one nitroaromatic compound was present. The analytical results from all four properties will be used by site personnel for informational purposes during excavation but are not expected to cause any significant environmental impact.

The results of these analyses were also intended to be used in determining if any additional personnel protection would be required during excavation. Results indicate that no additional protective measures are needed beyond those required for normal radiological protection.

5.0 REFERENCES

1. Oak Ridge Associated Universities (ORAU) 1986, E.J. Deming, "Radiological Survey U.S. Army Reserve Property Weldon Spring Site, St. Charles County, Missouri", prepared by Radiological Site Assessment Program, ORAU, Oak Ridge, Tennessee for the U.S. Department of Energy as part of the

Formerly Utilized Sites Remedial Action Program (FUSRAP).

2. MK-Ferguson Company and Jacobs Engineering Group Inc. 1987, "Report on Radiological Findings and Recommendations Regarding Army Reserve Property Vicinity Property No. 1, prepared by Environmental Safety and Health Department, for the U.S. Department of Energy as part of the Weldon Spring Site Remedial Action Program (WSSRAP).

3. MK-Ferguson Company and Jacobs Engineering Group Inc. 1987, "Report on Radiological Findings and Recommendations Regarding Army Reserve Property Vicinity Property No. 2, prepared by Environmental Safety and Health Department, for the U.S. Department of Energy as part of the Weldon Spring Site Remedial Action Program (WSSRAP).

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5. MK-Ferguson Company and Jacobs Engineering Group Inc. 1987, "Report on Radiological Findings and Recommendations Regarding Army Reserve Property Vicinity Property No. 7, prepared by Environmental Safety and Health Department, for

the U.S. Department of Energy as part of the Weldon Spring Site Remedial Action Program (WSSRAP).

6. United States Atomic Energy Commission, 1960, Office of Technical Information. Expansion Program at St. Louis Area - Project No. 224-5066A. Department of Commerce, Washington 25 D.C.

APPENDIX
RESULTS OF INDIVIDUAL CHEMICAL ANALYSES

VICINITY PROPERTY NO. 1: TRACKS

METALS EPA CLP METHOD	CONCENTRATION UG/G
Aluminum	18278
Antimony	{5.4}
Arsenic	12
Barium	210
Beryllium	1.04
Cadmium	3
Calcium	5764
Chromium	29
Cobalt	16
Copper	24
Iron	22451
Lead	29
Lithium	12
Magnesium	3116
Manganese	645
Mercury	0.1U
Nickel	25
Potassium	945
Selenium	0.6U
Silver	2.5
Sodium	{192}
Thallium	1U
Vanadium	47
Zinc	83

Nitroaromatics USATHAMA METHOD	CONCENTRATION UG/G
DATE EXTRACTED :08/19/87	
DATE ANALYZED :09/18/87	
2,4,6-TNT	1.56
2,4 DNT	0.975
2,6 DNT	1.83
Nitrobenzene	1.87
1,3,5-Trinitrobenzene	0.741
1,3-Dinitrobenzene	1.17

MISCELLANEOUS	PERCENT
Percent Moisture	23.1

Radiochemical	Activity +/- Error (pCi/G)
Thorium-230 EPA 00.07	<1

VICINITY PROPERTY NO. 1: OUTER ZONE

METALS EPA CLP METHOD	CONCENTRATION UG/G
Aluminum	10535
Antimonv	{4.0}
Arsenic	15.7
Barium	222
Bervllium	0.8
Cadmium	2.5
Calcium	2043
Chromium	18.9
Cobalt	14
Copper	13
Iron	1928
Lead	29.2
Lithium	6U
Magnesium	1632
Manganese	1268
Mercurv	0.1U
Nickel	14
Potassium	726
Selenium	0.6U
Silver	1.5
Sodium	{429}
Thallium	1U
Vanadium	39
Zinc	43

Nitroaromatics USATHAMA METHOD	CONCENTRATION UG/G
DATE EXTRACTED :08/19/87	
DATE ANALYZED :09/18/87	
2,4.6-TNT	1.41
2,4 DNT	0.880
2.6 DNT	1.65
Nitrobenzene	1.69
1,3.5-Trinitrobenzene	0.670
1,3-Dinitrobenzene	1.06

MISCELLANEOUS	PERCENT
Percent Moisture	14.9

VICINITY PROPERTY NO. 1: OUTER ZONE

SEMI-VOLATILES EPA CLP METHOD

DATE EXTRACTED: 08/18/87
DATE ANALYZED:09/03/87

	CONCENTRATION UG/KG
Phenol	388 U
bis(2-Chloroethvl) ether	388 U
2-Chlorophenol	388 U
1,3-Dichlorobenzene	388 U
1,4-Dichlorobenzene	388 U
Benzvl Alcohol	388 U
1,2-Dichlorobenzene	388 U
2-Methvlphenol	388 U
bis(2-Chloroisopropvl) ether	388 U
4-Methvlphenol	388 U
N-Nitroso-Dipropvlamine	388 U
Hexachloroethane	388 U
Nitrobenzene	388 U
Isophorone	388 U
2-Nitrophenol	388 U
2,4-Dimethyphenol	388 U
Benzoic Acid	1879 U
bis(2-Chloroethoxy) methane	388 U
2,4-Dichlorophenol	388 U
1,2,4-Trichlorobenzene	388 U
Naphthalene	388 U
4-Chloroaniline	388 U
Hexachlorobutadiene	388 U
4-Chloro-3-methvlphenol (para-chloro-meta-cresol)	388 U
2-Methvlnaphthalene	388 U
Hexachlorocyclopentadiene	388 U
2,4,6-Trichlorophenol	388 U
2,4,5-Trichlorophenol	1879 U
2-Chloronaphthalene	388 U
2-Nitroaniline	1879 U
Dimethvl Phthalate	388 U
Acenaphthylene	388 U
2,6-Dinitrotoluene	388 U
3-Nitroaniline	1879 U
Acenaphthene	388 U
2,4-Dinitrophenol	1879 U
4-Nitrophenol	1879 U
Dibenzofuran	388 U
2,4-Dinitrotoluene	388 U
Diethvlphthalate	388 U
4-Chlorophenyl Phenyl Ether	388 U
Fluorene	388 U
4-Nitroaniline	1879 U

VICINITY PROPERTY NO. 1: OUTER ZONE

4,6-Dinitro-2-methylphenol	1879 U
N-nitrosodiphenylamine	388 U
4-Bromophenyl Phenyl ether	388 U
Hexachlorobenzene	388 U
Pentachlorophenol	1879 U
Phenanthrene	388 U
Anthracene	388 U
Di-n-butylphthalate	670
Fluoranthene	388 U
Pyrene	388 U
Butyl Benzyl Phthalate	388 U
3,3'-Dichlorobenzidine	775 U
Benzo(a)anthracene	388 U
Chrysene	388 U
bis(2-ethylhexyl)phthalate	388 U
Di-n-octyl Phthalate	388 U
Benzo(b)fluoranthene	388 U
Benzo(k)fluoranthene	388 U
Benzo(a)pyrene	388 U
Indeno(1,2,3-cd)pyrene	388 U
Dibenzo(a,h)anthracene	388 U
Benzo(g,h,i)perylene	388 U

PCB'S EPA CLP METHOD	CONCENTRATION UG/G
DATE ANALYZED :08/30/87	
Aroclor-1016	<10
Aroclor-1221	<10
Aroclor-1232	<10
Aroclor-1242	<10
Aroclor-1248	<10
Aroclor-1254	<10
Aroclor-1260	<10

Radiochemical	Activity +/- Error (pCi/G)
Thorium-230 EPA 00.07	<1

VICINITY PROPERTY NO. 1: PERIMETER

METALS EPA CLP METHOD	CONCENTRATION UG/G
Aluminum	13243
Antimony	(5.4)
Arsenic	19.2
Barium	310
Beryllium	1.01
Cadmium	3.8
Calcium	3869
Chromium	31
Cobalt	53
Copper	60.4
Iron	23408
Lead	76
Lithium	8.4
Magnesium	2943
Manganese	2044
Mercury	0.1U
Nickel	36.6
Potassium	907
Selenium	0.5U
Silver	3.8
Sodium	(408)
Thallium	1U
Vanadium	44.3
Zinc	116

Nitroaromatics USATHAMA METHOD	CONCENTRATION UG/G

DATE EXTRACTED :08/19/87
DATE ANALYZED :09/18/87

2,4,6-TNT	1.35
2,4 DNT	0.842
2,6 DNT	1.58
Nitrobenzene	1.62
1,3,5-Trinitrobenzene	0.640
1,3-Dinitrobenzene	1.01

MISCELLANEOUS	PERCENT
Percent Moisture	11.0

Radiochemical	Activity +/- Error (pCi/G)
Thorium-230 EPA 00.07	2.4 +/- 0.4

VICINITY PROPERTY NO. 2

METALS EPA CLP METHOD	CONCENTRATION UG/G
Aluminum	9441
Antimony	24.5
Arsenic	18
Barium	187
Beryllium	1.2
Cadmium	25.7
Calcium	16306
Chromium	585
Cobalt	30.6
Copper	252
Iron	67660
Lead	104
Lithium	16
Magnesium	2768
Manganese	818
Mercury	0.1U
Nickel	91
Potassium	817
Selenium	0.5U
Silver	6.5
Sodium	(425)
Thallium	1U
Vanadium	89
Zinc	39

Nitroaromatics USATHAMA METHOD	CONCENTRATION UG/G
DATE EXTRACTED :08/19/87	
DATE ANALYZED :09/18/87	
2.4.6-TNT	1.26
2,4 DNT	0.787
2.6 DNT	1.48
Nitrobenzene	1.51
1,3.5-Trinitrobenzene	0.600
1,3-Dinitrobenzene	9.44

Miscellaneous	PERCENT
Percent Moisture	4.7

VICINITY PROPERTY NO. 2

SEMI-VOLATILES EPA CLP METHOD

DATE EXTRACTED: 08/18/87
DATE ANALYZED: 09/03/87

	CONCENTRATION UG/KG
Phenol	346 U
bis(2-Chloroethvl) ether	346 U
2-Chloroohenol	346 U
1,3-Dichlorobenzene	346 U
1,4-Dichlorobenzene	346 U
Benzyl Alcohol	346 U
1.2-Dichlorobenzene	346 U
2-Methylphenol	346 U
bis(2-Chloroisopropyl) ether	346 U
4-Methylphenol	346 U
N-Nitroso-Dipropvlamine	346 U
Hexachloroethane	346 U
Nitrobenzene	346 U
Isophorone	346 U
2-Nitrophenol	346 U
2,4-Dimethyphenol	346 U
Benzoic Acid	1679 U
bis(2-Chloroethoxy) methane	346 U
2,4-Dichlorophenol	346 U
1,2,4-Trichlorobenzene	346 U
Naphthalene	346 U
4-Chloroaniline	346 U
Hexachlorobutadiene	346 U
4-Chloro-3-methvlphenol (para-chloro-meta-cresol)	346 U
2-Methylnaphthalene	346 U
Hexachlorocvclopentadiene	346 U
2,4,6-Trichlorophenol	346 U
2,4,5-Trichlorophenol	1679 U
2-Chloronaphthalene	346 U
2-Nitroaniline	1679 U
Dimethvl Phthalate	346 U
Acenaphthylene	346 U
2.6-Dinitrotoluene	346 U
3-Nitroaniline	1679 U
Acenaphthene	346 U
2,4-Dinitrophenol	1679 U
4-Nitrophenol	1679 U
Dibenzofuran	346 U
2,4-Dinitrotoluene	346 U
Diethylphthalate	346 U
4-Chlorophenyl Phenyl Ether	346 U
Fluorene	346 U
4-Nitroaniline	1679 U

VICINITY PROPERTY NO. 2

4,6-Dinitro-2-methylphenol	1679 U
N-nitrosodiphenylamine	346 U
4-Bromophenyl Phenyl ether	346 U
Hexachlorobenzene	346 U
Pentachlorophenol	1679 U
Phenanthrene	346 U
Anthracene	346 U
Di-n-butylphthalate	750 U
Fluoranthene	346 U
Pyrene	346 U
Butyl Benzyl Phthalate	346 U
3,3'-Dichlorobenzidine	693 U
Benzo(a)anthracene	346 U
Chrysene	280 U
bis(2-ethylhexyl)phthalate	346 U
Di-n-octyl Phthalate	346 U
Benzo(b)fluoranthene	346 U
Benzo(k)fluoranthene	110 U
Benzo(a)pyrene	346 U
Indeno(1,2,3-cd)pyrene	346 U
Dibenzo(a,h)anthracene	346 U
Benzo(g,h,i)perylene	220 U

PCB'S EPA CLP METHOD	CONCENTRATION UG/G

DATE ANALYZED :08/30/87

Aroclor-1016	<10
Aroclor-1221	<10
Aroclor-1232	<10
Aroclor-1242	<10
Aroclor-1248	<10
Aroclor-1254	<10
Aroclor-1260	<10

Radiochemical	Activity +/- Error (pCi/G)
Thorium-230 EPA 00.07	2.9 +/- 0.5

VICINITY PROPERTY NO. 3

METALS EPA CLP METHOD	CONCENTRATION UG/G
Aluminum	1355
Antimonv	12.4
Arsenic	6.7
Barium	54
Bervllium	1.1
Cadmium	5.8
Calcium	39721
Chromium	42
Cobalt	16
Copper	201
Iron	34924
Lead	226
Lithium	5U
Magnesium	{496}
Manganese	298
Mercury	0.1U
Nickel	66
Potassium	634
Selenium	0.5U
Silver	3.9
Sodium	{532}
Thallium	1U
Vanadium	23
Zinc	235

Nitroaromatics USATHAMA METHOD	CONCENTRATION UG/G

DATE EXTRACTED :08/19/87
DATE ANALYZED :09/18/87

2,4.6-TNT	1.37
2,4 DNT	0.854
2.6 DNT	1.61
Nitrobenzene	1.64
1,3.5-Trinitrobenzene	0.650
1,3-Dinitrobenzene	1.02

MISCELLANEOUS	PERCENT
Percent Moisture	12.2
Radiochemical	Activitv +/- Error (pCi/G)
Thorium-230 EPA 00.07	2.2 +/- 0.4

VICINITY PROPERTY NO. 7

METALS	CONCENTRATION MG/KG
Aluminum	9446
Antimonv	14.8
Arsenic	6.0
Barium	103
Bervllium	0.9
Cadmium	3.4
Calcium	39202
Chromium	28
Cobalt	11
Copper	61
Iron	13599
Lead	87
Lithium	5U
Magnesium	5603
Manganese	486
Mercury	0.29
Nickel	16
Potassium	498
Selenium	0.5UN
Silver	4.5
Sodium	595
Thallium	1U
Vanadium	38
Zinc	69

Nitroaromatics CONCENTRATION UG/G

DATE EXTRACTED :07/17/87
DATE ANALYZED :07/24/87

	DETECTION LIMIT	RESULTS
2.4.6-TNT	1.33	ND
2,4 DNT	0.83	ND
2.6 DNT	1.56	ND
Nitrobenzene	1.59	ND
1,3.5-Trinitrobenzene	0.63	ND
1,3-Dinitrobenzene	0.99	ND

Miscellaneous	CONCENTRATION MG/KG
Nitrate	13.7
Sulfate	33.0
Choride	18.9
Fluoride	5.9
% Moisture	

Radiochemical	ACTIVITY +/- ERROR (pCi/LITER)
Thorium 230	12 +/- 2

— Enclosure 01 —

RADIOLOGICAL SURVEY
U.S. ARMY RESERVE PROPERTY
WELDON SPRING SITE
ST. CHARLES COUNTY, MISSOURI

Prepared by

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Formerly Utilized Sites - Remedial Action Program

FINAL REPORT

January 1986

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RADIOLOGICAL SURVEY
U.S. ARMY RESERVE PROPERTY
WELDON SPRING SITE
ST. CHARLES COUNTY, MISSOURI

INTRODUCTION

From 1957 to 1966 the Weldon Spring Chemical Plant in St. Charles County, Missouri, was used to convert uranium ore concentrates and recycled uranium scrap to uranium tetrafluoride, uranium trioxide, and metallic uranium. Smaller quantities of thorium oxide were also processed at these facilities. The plant was operated by Mallinckrodt Chemical Works - Uranium Division, under contract with the Atomic Energy Commission (AEC). Residues and contaminated wastes from these operations were placed in four onsite raffinate pits. During the same period, and for several years following the termination of uranium and thorium processing operations, the AEC also disposed of residues, contaminated scrap, and building rubble in an abandoned rock quarry, approximately 5 km southwest of the chemical plant site. Since termination of AEC activities in 1969, the chemical plant and the quarry have remained essentially unused and in caretaker status.

As successor to the AEC, the Department of Energy (DOE) is responsible for the management and ultimate disposal of the radioactive wastes from previous operations of the Weldon Spring Chemical Plant. Although wastes are primarily limited to the pits, quarry, and the chemical plant, aerial and surface monitoring have identified low-level contamination on portions of the surrounding properties. Water monitoring has also indicated elevated radionuclide levels in several of the springs and lakes on the adjacent properties. At the request of the Department of Energy's Office of Nuclear Energy, the Radiological Site Assessment Program of Oak Ridge Associated Universities (ORAU) conducted a radiological survey of the United States Army Reserve Property, adjacent to the former Weldon Spring Chemical Plant, to determine the extent and levels of offsite contamination resulting from previous AEC operations and current onsite waste storage.

SITE HISTORY

In 1941, the Department of the Army acquired 6,974 hectares, surrounding what is now the Weldon Spring Chemical Plant, as the site for an explosives production facility known as the Weldon Spring Ordnance Works. Following shut down of Ordnance Works in 1944, land which was declared surplus to army needs was transferred to the Missouri State Conservation Commission for wildlife conservation; the University of Missouri for agricultural purposes; and the St. Charles County Consolidated School District. The remaining land (835 ha) was placed under the control of the Department of the Army. In 1959, 752 ha was designated as a U.S. Army Reserve Training area. Of that amount, 6 ha was transferred to the AEC in 1964 for construction of raffinate pit #4. Currently, the U.S. Army Reserve area is comprised of the remaining 746 ha. There is no history of storage, use or disposal of radioactive material on the Army Reserve Property.

SITE DESCRIPTION

The Weldon Spring site is located on State Highway 94, approximately 22 km southwest of St. Charles, Missouri (Figure 1). The nearest community is Weldon Spring at the intersection of Highway 94 with U.S. Highways 40 and 61. Vicinity properties are indicated in Figure 2. The U.S. Army Reserve Property is a fenced area occupying approximately 746 hectares. The land is relatively level. Portions of the property are cleared and easily accessible while other sections are wooded or overgrown with heavy brush. An extensive system of drainage ditches exists on the property, primarily for surface runoff. One main easement, herein called the Southeast Drainage Easement, runs south from the Weldon Spring Chemical Plant to the Missouri River. This easement crosses the southeast corner of the Army Reserve Property for approximately 300 m. The site contains numerous paved and unpaved roads, several inactive railroad tracks, a few small lakes or ponds and many small buildings. Remnants of other railroad tracks and buildings, previously associated with ordnance manufacturing operations, remain on the property.

SURVEY PROCEDURES

The survey of the Army Reserve Property, Weldon Spring Site was performed by the Radiological Site Assessment Program of Oak Ridge Associated Universities (ORAU) during March-July 1985. The survey was performed in accordance with a survey plan dated December 21, 1984 and approved by the Department of Energy's Office of Nuclear Energy. The methods and procedures utilized in that survey are presented in this section.

Aerial photographs and drawings of the Weldon Spring Site, including the U.S. Army Reserve Property, dating from 1957 to the present were reviewed to aid in determining the best radiological survey approach and most probable sites of contamination.

Field Procedures

1. Walkover surface scans were conducted at 1-2 m intervals over interior and perimeter roads, trails, railroads and major surface drainage pathways. Portable gamma NaI(Tl) scintillation survey meters were used for these scans. Areas with elevated radiation levels were noted for further definitive surveys.

2. Gamma measurements were made at the surface and at 1 m above the surface at 100 m intervals along major roadways, railroads and drainage ditches. These measurements were made either to the left (L), right (R) or in the center (C) of the traverse unless otherwise indicated. The measurements were made using portable NaI(Tl) scintillation meters and results were converted to exposure rates in microroentgens per hour (μR/h) by comparison with a calibrated pressurized ionization chamber.

   Direct radiation measurements were also made at locations of elevated surface levels as identified by the walkover surface scans.

3. Surface (0-15 cm) soil samples of approximately 1 kg each were collected at 100 m intervals along major roadways, railroads and

drainage ditches. Samples were collected 1 m to the left (L), right (R) or in the center (C) of the traverse unless otherwise indicated.

4. Grid systems were established in two areas where more extensive surface contamination was identified by walkover scans.

Walkover surface scans were conducted at 1-2 m intervals over the entire gridded area using gamma scintillation detectors. Locations of elevated contact radiation levels were noted for further sampling.

Gamma measurements were made at the surface and at 1 m above the surface at each grid intersection and at elevated locations identified by the walkover scan.

Dose rate measurements were measured 1 cm above the surface at each gridline intersection using thin-window (<7 mg/cm^2) G-M detectors and portable scaler/ratemeters. Measurements were also obtained with the detector shielded to evaluate the contribution of nonpenetrating beta and low-energy gamma radiations. Meter readings were converted to dose rates in microrads per hour (µrad/h).

Surface (0-15 cm) soil samples of approximately 1 kg each were collected at each accessible grid intersection and at selected locations identified by the walkover scan.

5. Nineteen boreholes were drilled on the Army Reserve Property at locations shown on Figure 3. Boreholes were drilled by Continental Drilling using a truck-mounted hollow stem auger. Locations of the boreholes were selected based on site accessibility and results of surface measurements and analysis of surface soil samples. Locations were selected to provide representative coverage of the Army Reserve Property and further examine areas of contamination.

Radiation profiles of the boreholes were determined by measuring gamma radiation at 30 cm intervals from the surface to the bottom of the borehole using a collimated NaI(Tl) gamma scintillation probe and portable scaler.

Samples of subsurface soil were obtained at various depths using a split-spoon sampler.

Ground water samples were obtained from five of the boreholes.

Soil samples were collected from shallow boreholes, ranging in depth from the soil surface to 100 cm, at selected locations of elevated surface radiation levels identified by the walkover surface scan.

6. Samples of surface water were collected from creeks, ponds, drainage ditches, and easements (Figure 4).

7. Sediment samples were obtained at locations of surface water sampling and also at 100 m intervals along major surface drainage ditches. Additional sediment samples were collected in areas of contamination identified in the walkover scans.

8. Buildings which were intact and accessible were scanned using NaI gamma scintillation meters. Direct alpha and beta-gamma surface measurements were made on floors, walls, ceilings, and equipment. Smear samples were obtained for measurement of transferable alpha and beta contamination. Buildings which were no longer intact and consisted mainly of rubble and concrete were scanned using NaI(Tl) gamma scintillation meters. Figure 5 shows the location of buildings on the Army Reserve Property.

9. Six soil samples and five water and sediment samples were collected from the Weldon Spring area (but not on the Weldon Spring Chemical Plant or associated vicinity properties) to provide baseline concentrations of radionuclides for comparison purposes. Direct background radiation levels were measured at locations where baseline soil samples were collected. The locations of the baseline samples and background measurements are shown on Figure 6.

10. Civil surveys were performed by a local surveying agency to identify areas of contamination relative to the ordnance grid coordinate

system. (Because of the distances of some areas from state grid benchmarks, it was not possible to tie locations to the state grid coordinate system.) Permanent markers were installed at each of the contaminated areas.

Sample Analysis Procedures/Data Analysis Procedures

Soil and sediment samples were analyzed by gamma spectrometry. Radionuclides of interest included U-238, Th-232, and Ra-226, however, the spectra were also reviewed for other gamma emitters. Water samples were analyzed for gross alpha and gross beta concentrations. In addition, water samples which exceeded 15 pCi/l gross alpha, were analyzed for Ra-226, Ra-228, and isotopic uranium concentrations. Two samples were also analyzed for isotopic thorium. Smear samples were analyzed for transferable gross alpha and beta contamination. Additional information concerning equipment and procedures is contained in Appendices A and B.

Results of this survey were compared to the DOE guidelines for residual radioactivity at formerly utilized and surplus facilities sites. (Refer to Appendix C)

RESULTS

The results of this survey are presented in two sections. Part A provides general survey findings, identifying locations of contamination. Further characterization of these contaminated areas is discussed in Part B.

A. General Survey Results

Background Levels and Baseline Concentrations

Background exposure rates and baseline radionuclide concentrations in soil determined for the vicinity of the Weldon Spring vicinity properties are presented in Table 1A. Exposure rates ranged from 5 to 8 μR/h. Concentration of radionuclides in soil were: Ra-226, 0.55 to 0.92 pCi/g (picocuries per gram); U-238, <0.68 to 1.62 pCi/g; and Th-232, 0.95 to 1.48 pCi/g. These concentrations are typical of the radionuclide levels normally encountered in surface soils.

Baseline radionuclide concentrations determined in sediment are presented in Table 1B. Radium-226 concentrations ranged from 0.35 to 0.92 pCi/g; U-238 concentrations ranged from <0.66 to 1.4 pCi/g and Th-232 concentrations ranged from 0.24 to 1.02 pCi/g. These concentrations are typical of radionuclides normally encountered in sediment.

Radioactivity levels in baseline water samples are presented in Table 1C. Gross alpha concentrations ranged from 0.48 to 4.09 pCi/1 (picocuries per liter). Gross beta concentrations ranged from 3.50 to 7.39 pCi/1. These are typical concentrations normally occurring in surface water.

<u>Army Property Railroad System</u>

Direct Measurements

Direct radiation levels, measured at 100 m intervals along the entire railway system within the Army property (Figure 7), are presented in Tables 2 and 3. The gamma exposure rates measured at 1 m above the surface ranged from 6 to 13 µR/h. Surface exposure rates ranged from 6 to 9 µR/h.

The walkover survey identified two areas of generally elevated surface radiation levels containing numerous "hot spots" (designated as Locations #1 and #2), and one smaller area with a few isolated "hot spots", which has been designated as Location #3.

Radionuclide Concentrations in Surface Soil

Radionuclide concentrations measured at 100 m intervals along the Army Property Railways are presented in Tables 4 and 5. All concentrations measured are within the normal range of baseline samples, with the exception of the concentrations measured along Railroad #2' (refer to Table 5) which is adjacent to an area which has been identified as contaminated (Location #1). Uranium-238 concentrations measured at 50 m intervals along Railroad #2' ranged from 0.98 to 143 pCi/g. Radium-226 and Th-232 concentrations are within the normal baseline ranges.

Major Army Property Roads

Direct Measurements

Direct radiation levels, measured at 100 m intervals along the major roads (Figures 8, 9 and 10), are presented in Tables 6-12. The gamma exposure rates at 1 m above the surface ranged from 5 to 9 µR/h and surface contact gamma exposure rates were from 5 to 8 µR/h.

The walkover survey of the major roads identified one isolated "hot spot", one meter to the north of Road #1, 1154 m from the property entrance gate. This spot has been designated as Location #7 and is shown on Figure 11.

Radionuclide Concentration in Surface Soil

Concentrations of radionuclides measured in surface soil collected at 100 m intervals are presented in Tables 13-19. Levels of Ra-226, U-238 and Th-232 were below the minimum detectable activity or within the range of the baseline samples.

Secondary Army Property Roads

Walkover surveys of approximately 75% of the secondary roadways did not indicate any areas of elevated surface radiation; further measurements and sampling were therefore not performed along these roadways.

Major Surface Drainage Ditches

Direct Measurements

Direct radiation levels measured at 100 m intervals along the major surface drainage ditches (#4, #4A, ditch from Location #1 - Figure 4) are presented in Table 20. Gamma exposure rates measured at 1 m above the surface ranged from 7 to 11 µR/h and surface measurements ranged from 7 to 14 µR/h.

Gamma exposure rates measured along a short section of drainage ditch paralleling the underground section of the Southeast Drainage Easement (Figure 17) ranged from 5 to 8 μR/h at the surface. Because these were background levels and no elevated radiation levels were identified, additional measurements and sampling were not performed along this ditch.

The Southeast Drainage Easement is designated as Location #4 and is discussed in Results Section B.

Two areas of elevated surface radiation levels were identified by the walkover scan. All of the ditch running from the fenceline near the raffinate pit to ditch #4 has been designated as Location #5. The first 200 m of ditch #4, near the Army property fenceline has been designated as Location #6.

Radionuclide Concentrations in Sediment

Concentrations of radionuclides measured at 100 m intervals along the major surface drainage easements are presented in Table 21. Uranium-238 concentrations ranged from 0.46 to 59.2 pCi/g. The latter value was from a sample taken from ditch #4 at the Army property fenceline (Location #6). All other Uranium-238 values were <12.5 pCi/g. Radium-226 and Th-232 concentrations ranged from 0.53 to 1.57 pCi/g and 0.62 to 2.23 pCi/g, respectively.

Radionuclide Concentrations in Water

Radionuclide concentrations measured in water from surface drainage ditches were within the normal baseline values (Table 22).

<u>Schote Creek</u>

Direct Measurements

Direct radiation levels measured at 100 m intervals along Schote Creek are presented in Table 23. Gamma exposure rates measured at the surface and 1 m above the surface did not exceed 8 μR/h.

Radionuclide Concentrations in Sediment

Radionuclide concentrations measured in sediment collected at 100 m intervals along Schote Creek are presented in Table 23. All concentrations measured were within the range of baseline concentrations.

Army Property Ponds

Radionuclide Concentrations in Surface Water

Radionuclide concentrations measured in two ponds located on the Army Reserve property (Figure 4) are presented in Table 22. Gross alpha and beta concentrations are within the range of baseline concentrations.

Radionuclide Concentrations in Sediment

Sediment samples obtained at locations of surface water sampling contain concentrations within the range normally encountered in baseline samples (Table 25).

Borehole Gamma-Logging Measurements

The locations of boreholes drilled on the Army Property are shown on Figure 3. Borehole gamma-logging did not identify any elevated subsurface radiation levels. Logging data were not used to quantify radionuclide concentrations in the subsurface soil due to the absence of significant positive findings and the varying ratios of different gamma-emitting radionuclides in soils at this site.

Radionuclide Concentrations in Subsurface Soil from Boreholes

Radionuclide concentrations measured in subsurface soil from boreholes are presented in Table 26. None of the 19 boreholes contained subsurface radionuclide concentrations significantly different from baseline soil concentrations.

Radionuclide Concentrations in Subsurface Water from Boreholes

Gross alpha and beta concentrations in subsurface water samples collected from five boreholes are presented in Table 27. Gross alpha concentrations ranged from 0.60 to 9.10 pCi/l, which is within the range normally encountered in nature.

Building Surveys

The results of the building surveys for buildings 1-3 and 14-21 are summarized in Table 28. No areas of elevated direct radiation or surface contamination were noted. Further building measurements were therefore not necessary.

Walkover surveys of the rubble remaining from buildings 4-13 did not identify any areas of elevated surface measurements. Gamma exposure rates ranged from 5 μR/h to 10 μR/h.

B. Results at Identified Locations of Contamination

Location #1

Location #1 is adjacent to the Bechtel/DOE access road (Figure 7). A 10 m grid system was established in the southeast corner of Location #1 covering from 0 North to 50 North and 0 West to 50 West (Figure 12). Adjacent areas within Location #1 were sampled using either a 20 m or a 40 m grid interval. The larger grid intervals were used as surface radiation levels approached background levels.

Direct Measurements

Direct radiation levels measured at grid intersections are presented in Table 29. The gamma exposure rates measured at 10 m grid intervals 1 m above the surface ranged from 7 to 52 μR/h. Surface contact gamma exposure rates and beta-gamma dose rates ranged from 6 to 56 μR/h, and 6 to 1280 μrad/h, respectively. Within the 20 m and 40 m grids, gamma exposure rates 1 m above the surface ranged from 4 to 9 µR/h. At surface contact the exposure rates ranged from 4 to 11 µR/h and beta-gamma dose rates ranged from 4 to 44 µrad/h. Measurements performed with the detector shielded averaged approximately 40% less than those with the unshielded detector. This indicates that a small portion of the surface dose rate is due to nonpenetrating beta or low energy photon radiations. Exposure rates and dose rates were highest within the 10 m grid area and dropped to background levels within the 40 m grid section.

The walkover survey identified numerous locations of elevated surface radiation levels. These locations are indicated in Figure 13 and associated direct radiation levels are presented in Table 30. Contact gamma exposure rates ranged from 15 to 660 µR/h. Gamma exposure rates at 1 m above the surface and contact beta-gamma dose rates ranged from 7 to 59 µR/h and 610 to 60460 µrad/h, respectively.

Radionuclide Concentration in Surface Soil from Grid Intersections

Table 31 lists the concentrations of radionuclides measured in surface soil from 10 m, 20 m and 40 m grid intervals. Samples obtained from the 10 m grid area contained Ra-226 concentrations ranging from 0.42 to 18.1 pCi/g. The concentration of U-238 ranged from 0.60 to 1100 pCi/g and Th-232 concentrations ranged from 0.13 to 4.82 pCi/g. Radionuclide concentrations collected from the 20 m and 40 m grid sections are within the range encountered in baseline soil samples.

Radionuclide Concentration in Soil from Boreholes

Radionuclide concentrations measured in soil samples from randomly spaced shallow boreholes are presented in Table 32. Radium-226 concentrations ranged from 0.89 to 1.22 pCi/g. Concentrations of U-238 and Th-232 ranged from 1.01 to 4.35 pCi/g and 0.79 to 1.42 pCi/g, respectively.

Radionuclide concentrations in borehole samples from areas identified as having surface contamination are presented in Table 33. Uranium-238 concentrations ranged from 2.76 to 29,530 pCi/g. Radium-226 concentrations ranged between 0.70 and 40.1 pCi/g. Concentrations of Th-232 ranged from <0.46

to 450 pCi/g. Uranium-238 contamination was noted to at least 1 m below the soil surface.

At many locations of elevated contact radiation levels, pieces of metal, debris, and slag were encountered while sampling, preventing deeper samples from the same area. A 1.7 kg slag sample obtained at 8N, 14W had a total U-238 activity of 1.4 mCi (millicuries).

Radionuclide Concentration in Surface Water

Two samples of surface water were collected from the drainage ditch within Location #1 (Figure 12) and the radionuclide concentrations are presented in Table 34. Gross alpha and beta measurements in the sample collected at 18N, 50W were 3070 pCi/l and 4220 pCi/l, respectively. Uranium-238 and U-234 concentrations were 1699 pCi/l and 1643 pCi/l; Ra-226 and Ra-228 were <0.08 pCi/l and 0.2 pCi/l, respectively. The sample from 38N, 90W had gross alpha levels of 0.90 pCi/l and gross beta concentrations of 6.43 pCi/l.

Radionuclide Concentration in Drainage Ditch Sediments

Radionuclide concentrations in sediment samples, collected from locations along the drainage ditches within Location #1, are presented in Table 35. Radium-226 concentrations ranged from 0.60 to 1.27 pCi/g. Uranium-238 and Th-232 ranged from 1.09 to 781 pCi/g and 0.48 to 11.40 pCi/g.

Location #2

A 10 m grid system was established along an 80 m x 20 m section of Railroad #2 (Figures 7 and 14), and is designated as Location #2.

Direct Measurements

Direct radiation levels measured at the grid points are presented in Table 36. Contact gamma exposure rates ranged from 6 to 13 μR/h. Gamma exposure rates at 1 m above the surface and beta-gamma dose rates ranged from 6 to 14 μR/h and 7 to 120 μrad/h, respectively.

Direct radiation levels measured at locations identified in the walkover scan are presented in Table 37; their positions in the grid are shown in Figure 15. Gamma exposures rates at 1 m above the surface ranged from 8 to 21 μR/h. Contact gamma exposure rates and beta-gamma dose rates ranged from 17 to 150 μR/h and 92 to 4950 μrad/h, respectively.

Radionuclide Concentration in Surface Soil

The concentrations of radionuclides measured in surface soil collected at grid point intersections are listed in Table 38. The concentration of U-238 ranged from <0.97 to 57 pCi/g. Thorium-232 concentrations ranged from 0.49 to 1.91 pCi/g; Ra-226 concentrations ranged from 0.64 to 1.84 pCi/g.

Radionuclide Concentration in Soil from Boreholes

Location 2

Radionuclide concentrations measured in soil samples from shallow boreholes are presented in Table 39. Uranium-238 concentrations ranged from 160 to 1350 pCi/g. Concentrations of Ra-226 and Th-232 ranged from 0.99 to 5.00 pCi/g and 0.88 to 2.28 pCi/g, respectively.

At some locations of elevated contact radiation levels, pieces of metal and debris were encountered within the top 15 cm of soil. In many cases, the contact radiation levels decreased to background levels once the objects were removed. Contamination in most locations extends to at least 30 cm below the soil surface.

Concentrations of radionuclides in soil samples collected from two isolated locations identified in the walkover scan 23 m west of the gridded area are presented in Table 39. Uranium-238 and Ra-226 concentrations ranged from 10.1 to 390 pCi/g and 2.78 to 36.2 pCi/g, respectively.

<u>Location #3</u>

Location #3 is a wooden loading dock situated adjacent to Railroad #2, approximately 450 m from Location #2 (Figure 15). The structure rises approximately 4.5 m above railroad #2. Railroad #2B ends at the top of the loading dock.

Direct Measurements

Gamma exposure rates of 33 μR/h were measured in the area directly beneath the corners of the loading dock and 22 μR/h was measured on the southeast corner on the top of the loading dock.

Radionuclide Concentration in Surface and Subsurface Soil

Location 3

Radionuclide concentrations measured in samples obtained from the top of the loading dock and directly beneath the corners of the loading dock are presented in Table 40. Concentration of U-238 ranged from 436 to 2640 pCi/g and Ra-226 concentrations ranged from 0.82 to 4.46 pCi/g. Thorium-232 concentrations were below the minimum detectable activity.

The concentration of U-238 in the sample collected at the southeast corner of the top of the loading dock was 1042 pCi/g and the Ra-226 concentration was 4.46 pCi/g. The range of Ra-226 concentration in soil from the shallow borehole dug at the north east corner, lower level, of the loading dock was 0.82 to 3.14 pCi/g. The U-238 concentration ranged from 2640 pCi/g in the top 15 cm of soil to 477 pCi/g in the sample obtained from 45-60 cm below the soil surface.

Location #4

Location #4 is a short section of the main drainage easement running from the Imhoff Tanks within the Weldon Spring Chemical Plant to the Missouri River (Figure 17). It crosses the southeast corner of the Army property and is referred to as the Southeast Drainage Easement. The runoff flows through a 20 cm diameter underground cement pipe and surfaces approximately 200 m southeast of the chemical plant property fenceline. This drainage ditch continues above ground for approximately 305 m to the perimeter fence between the Army Property and Weldon Spring Wildlife Area.

Direct Measurements

Direct radiation levels, measured at soil sampling locations and at locations identified in the walkover scan along the length of the drainage easement crossing Army Reserve Property are presented in Table 41. Gamma exposure rates at 1 m above the surface ranged from 8 to 29 μR/h and exposure rates at the surface ranged from 7 to 120 μR/h.

Radionuclide Concentration in Soil

Radionuclide concentrations measured in surface soil at 100 m intervals along the easement are presented in Table 42. Concentrations of U-238 ranged from 1.26 pCi/g to 42.0 pCi/g. Radium-226 and Th-232 concentrations were from 0.76 to 8.36 pCi/g and 0.43 to 2.69 pCi/g, respectively.

Radionuclide Concentrations in Sediment

Concentrations measured in sediment samples collected at 100 m intervals are presented in Table 42. Uranium-238 concentration ranged from <1.56 to 39.7 pCi/g and Ra-226 concentration ranged from 4.34 to 6.57 pCi/g. The concentration of Th-232 ranged from 1.41 to 2.14 pCi/g.

Radionuclide Concentrations in Soil from Shallow Boreholes

Concentrations of radionuclides measured in soil samples from shallow boreholes are presented in Table 43. Five of the six boreholes contained elevated U-238 concentrations ranging up to 1010 pCi/g. Radium-226 concentrations ranged from 2.04 to 210 pCi/g and Th-232 levels ranged from 0.88 to 69.1 pCi/g. Radionuclide concentrations measured in the borehole at the origin of the drainage easement did not differ significantly from concentrations measured in baseline samples. Contamination extends to at least 60 cm below the soil surface in most of the borehole locations.

Radionuclide Concentrations in Surface Water

Two water samples were collected from the southeast drainage easement. The radionuclide concentrations measured in the drainage water are presented in Table 44. Both samples contained elevated gross alpha and beta concentrations. The sample collected at the origin of the easement had a gross alpha concentration of 147 pCi/l. The sample collected at the property fenceline had a gross alpha concentration of 159 pCi/l. Isotopic uranium, radium and thorium concentrations measured for both samples indicate that uranium is essentially the only contaminant.

Location #5

Location #5 is a surface drainage ditch leading from the raffinate pits to drainage ditch #4 (Figures 11 and 18).

Direct Measurements

Direct radiation levels measured at 100 m intervals along the drainage ditch are presented in Table 45. Gamma exposure rates were from 6 to 8 μR/h at the surface and 6 to 13 μR/h measured 1 m above the surface.

Direct measurements from areas of elevated surface readings identified in the walkover scan are presented in Table 46. The highest surface gamma exposure rate (45 μR/h) was measured at 202 m from the origin of the ditch.

Radionuclide Concentrations in Sediment

Radionuclide concentration in sediment samples collected at 100 m intervals are presented in Table 47. Uranium-238 concentrations ranged from <1.05 to 6.00 pCi/g; Ra-226 and Th-232 concentrations were from 0.61 to 8.22 pCi/g and 0.61 to 1.24 pCi/g, respectively.

Concentrations of radionuclides measured in sediment from areas of elevated surface contamination are presented in Table 48. Radium-226 concentrations ranged from 0.94 up to 62.6 pCi/g. U-238 and Th-232 levels were within the levels normally encountered in baseline samples.

Radionuclide Concentrations in Surface Water

Radionuclide concentration measured in a water sample obtained at the culvert 22 m from the origin of the ditch are presented in Table 22. Gross alpha concentration was 4.28 pCi/l and gross beta concentration was 3.22 pCi/l.

Location #6

Location #6 consists of approximately 200 m of Ditch #4 beginning at the Bechtel/DOE fenceline (Figures 11 and 19).

Direct Measurements

Direct radiation levels measured at locations identified in the walkover scan of ditch #4 are presented in Table 49. The surface gamma exposure rates were 14 μR/h and 15 μR/h measured at 95 m and 160 m, respectively. The exposure rate did not change significantly after a 1 kg surface soil sample was removed.

Radionuclide Concentrations in Soil from Shallow Boreholes

The radionuclide concentrations measured in two boreholes (at 95 m and 160 m) are presented in Table 50. Uranium-238 concentrations ranged from 40.1 to 123 pCi/g. Thorium-232 and Ra-226 concentrations were within the range normally encountered in baseline samples.

Location #7

Location #7 is an isolated "hot spot" located 1 m to the north of Road #1, 1154 m from the entrance to the Army Reserve Property.

Direct Measurements

Table 51 presents the direct radiation levels measured at this location. A maximum surface dose rate measurement of 500 μrad/h was recorded and the maximum surface exposure rate measured was 290 μR/h.

Radionuclide Concentrations In Soil From Shallow Boreholes

Radionuclide concentrations from a shallow borehole at location #7 indicate that the Ra-226 contamination is confined to the top 15 cm of the soil surface. The maximum Ra-226 concentration measured at this location was 215 pCi/g.

Uranium-238 and Th-232 concentrations did not vary significantly from baseline levels. The results from the analysis of soil samples obtained at Location #7 are presented in Table 52.

<u>Th-230 Analyses on Selected Samples</u>

Thorium-230 analysis was performed on selected samples from areas which had elevated uranium concentrations. Thorium-230 concentrations ranged from 1.39 $\pm$ 0.13 pCi/g to 53.4 $\pm$ 0.8 pCi/g (Table 53).

COMPARISON OF SURVEY RESULTS WITH GUIDELINES

The guidelines applicable to cleanup of vicinity properties at the Weldon Spring Site are presented in Appendix C. The Department of Energy criteria for residual uranium in soil specified for the Weldon Spring Vicinity Properties, is 60 pCi/g of U-238 above background provided that the isotopic uranium distribution is normal. The exposure rate criteria at 1 m above the surface is 20 μR/h above background or 27 μR/h for the Weldon Spring area. Radiation levels and radionuclide concentrations exceed these guideline values at seven locations.

Exposure rates at 1 m exceed the 27 μR/h criteria at Location #1 and at one sampling point (10 m) of Location #4 (Table 41). Uranium-238 concentrations in soil samples collected from locations of elevated contact radiation levels exceed the maximum concentrations in samples collected at all of the seven contaminated locations. Subsurface soil concentrations exceed the criteria for uranium at Locations #1, 2, 3, 4, and 6. Pieces of metal and rock prevented examination of the depth of contamination below approximately 1 m at Location #1. Simple regression of the data from several sample points within Location #1 indicate that contamination levels will likely decrease to below the DOE criteria for uranium within the first 125 cm of soil. The soil criteria for Ra-226 (5 pCi/g) are exceeded at Locations #5 and #7 to a maximum depth of approximately 1 m. Thorium-230 measured in selected samples from several different locations was found to exceed the guideline of 5 pCi/g at location #1. Uranium concentrations measured in these same samples are orders of magnitude greater then the measured Th-230 concentrations, therefore, uranium-238 will be the determining guideline factor. Table 54 and Figures 20-25 summarize the areas of residual contamination exceeding the DOE guidelines. The estimated total volume of soil to be removed to meet the guidelines is approximately 6 x 10^3 m^3.

The two samples of surface water from the southeast drainage easement and one sample from the ditch within Location #1 contained gross alpha concentrations in excess of EPA guidelines (15 pCi/l)[1]. Combined Ra-226 plus Ra-228 concentrations in water samples were less than 5 pCi/l. Isotopic analyses for uranium indicate that the total concentrations of U-234 plus U-238 exceed the measured gross alpha concentrations. When the uranium isotopic concentrations are subtracted from the total gross alpha concentration measurement the values are less than 15 pCi/l. It should be noted that gross alpha measurements are determined by calibrating against an alpha energy which is higher than the actual uranium energy; therefore, the gross alpha measurements will be slightly lower than the total isotopic measurements. The EPA standards are used here for comparison purposes only, because this water does not represent a source of drinking water.

SUMMARY

A radiological survey of the U.S. Army Reserve property located at Weldon Spring, Missouri was conducted at the request of the U.S. Department of Energy. The survey included surface radiation scans, measurements of direct radiation levels, and analysis of radionuclide concentrations in soil and water, both surface and subsurface. In addition, sediment samples from drainage ditches were analyzed and representative buildings (intact and destroyed) were surveyed.

The results of the survey identified seven areas of U-238, Ra-226, and/or Th-232 contamination exceeding DOE guidelines. Subsurface sampling and measurements indicate that contamination is generally limited to the upper 1 m of soil, although contamination at Location #1 may extend to approximately 1.25 m below the surface. Reduction of contamination to guideline levels would require the removal of approximately 6 x 10^3 m^3 of material. In addition, portions of the wooden loading dock at Location #3 may need to be removed.

Although there are areas of contaminated residues on portions of this property, the contaminants do not currently pose potential health risks to personnel on the property or to the general public. There is evidence that offsite migration of radioactive materials is continuing via the Southeast Drainage Easement and the drainage ditches from the Raffinate Pit and Ash Pond on the adjacent DOE property.

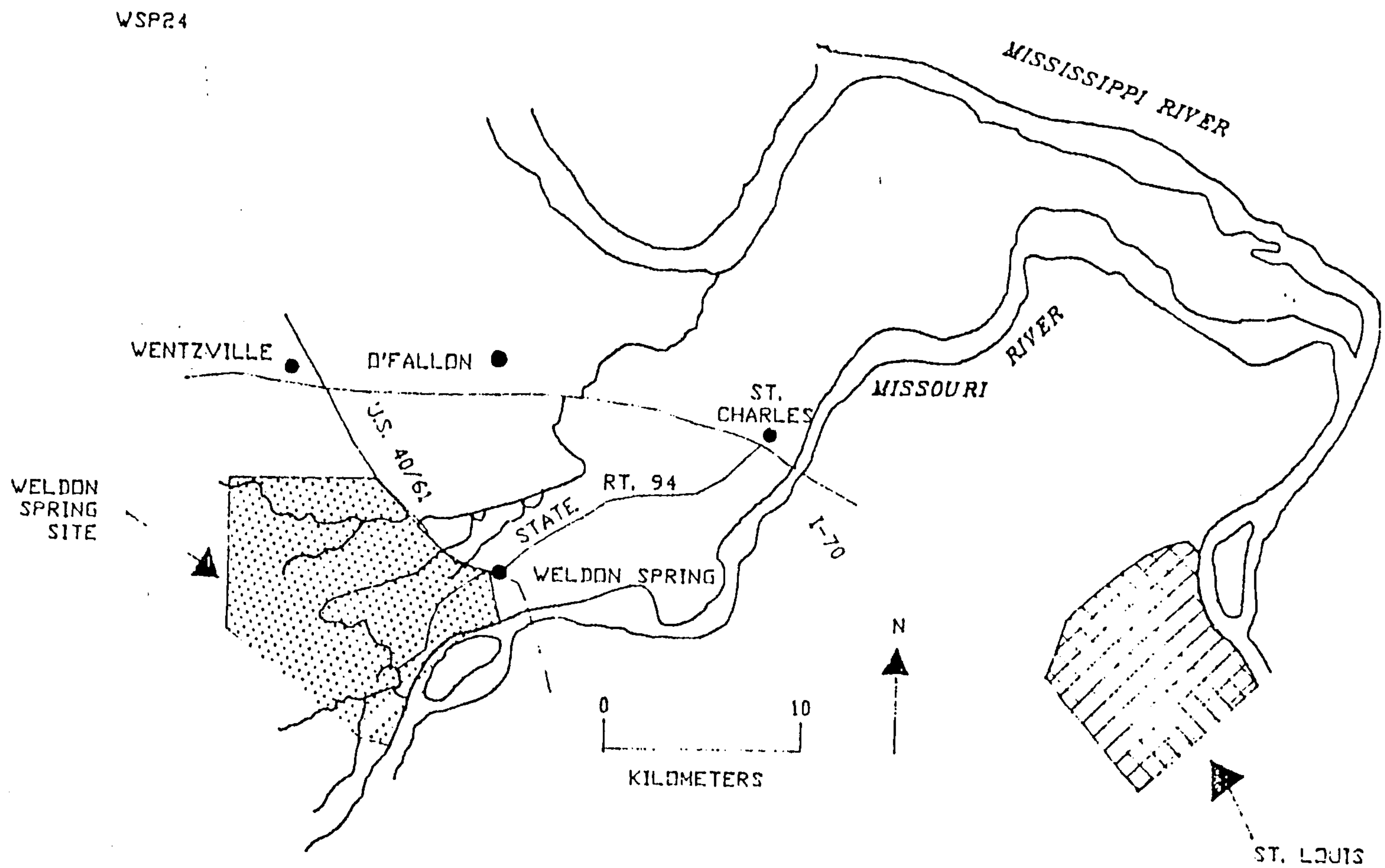

FIGURE 1: Eastern Missouri Indicating the Location of the Weldon Spring Site and Vicinity Properties.

WSP16

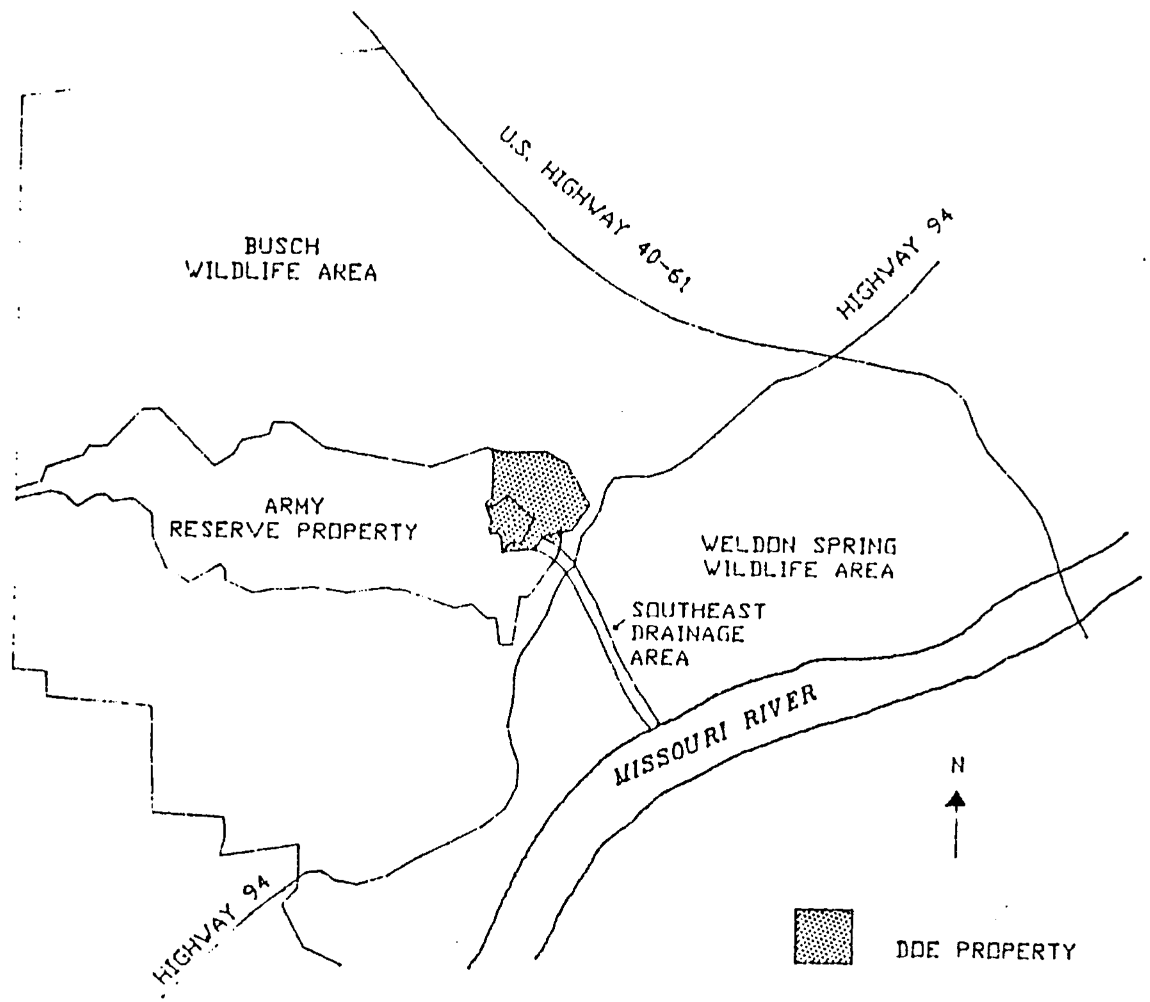

FIGURE 2: Property Bordering U.S. Army Reserve
Weldon Spring, Mo.

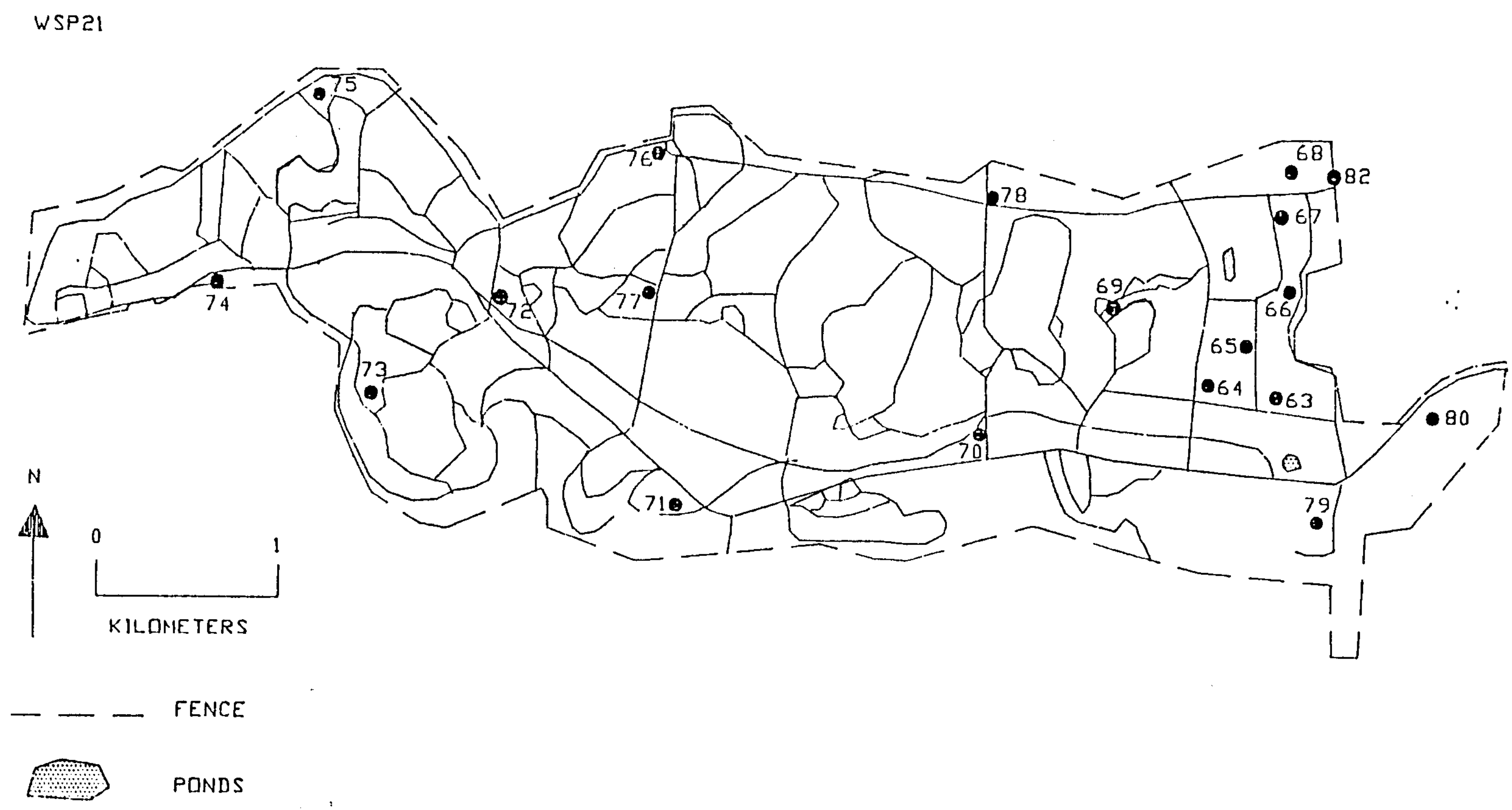

FIGURE 3: Location of Boreholes on Army Reserve Property.

WSP28

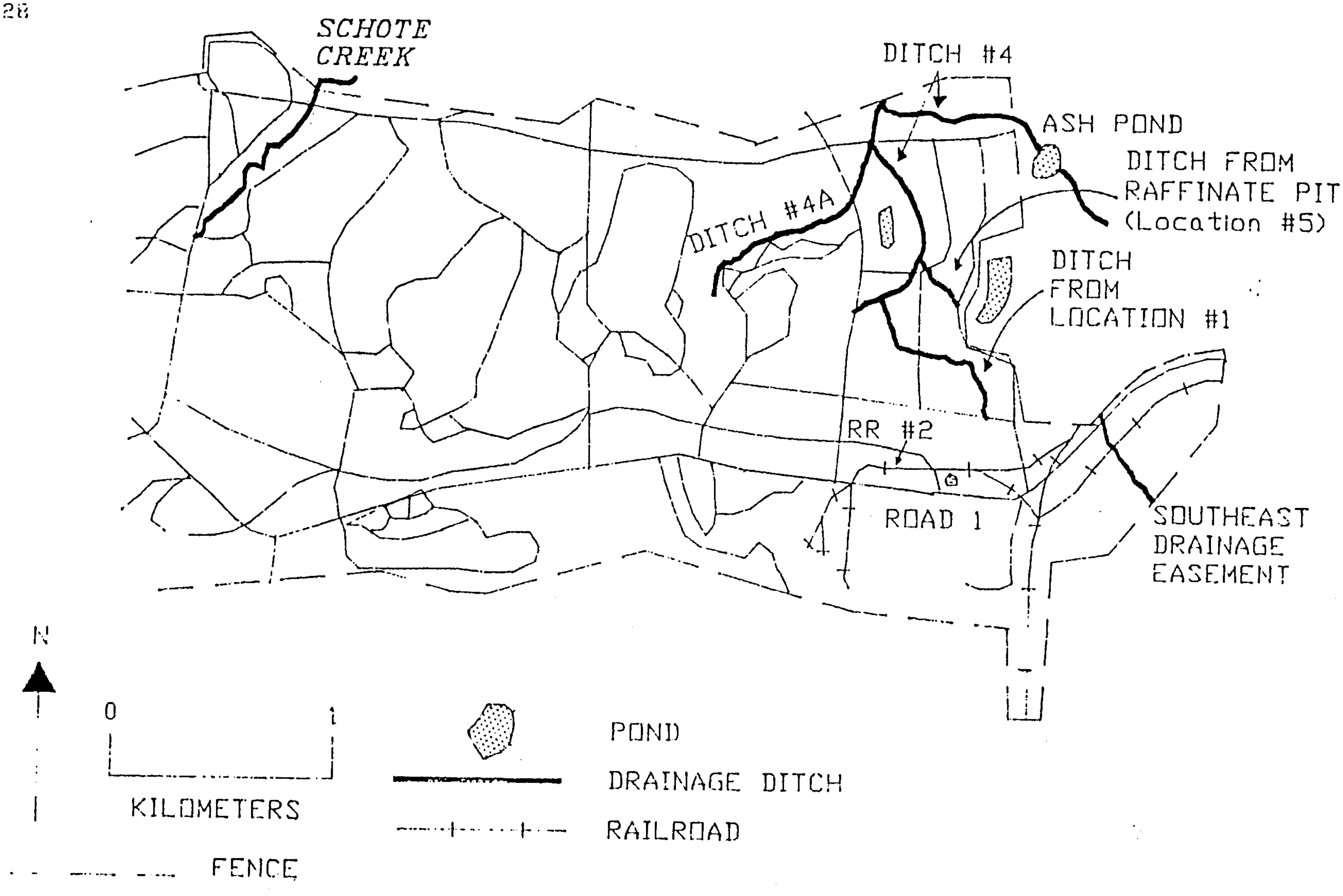

FIGURE 4: Location of Major Surface Drainage Ditches.

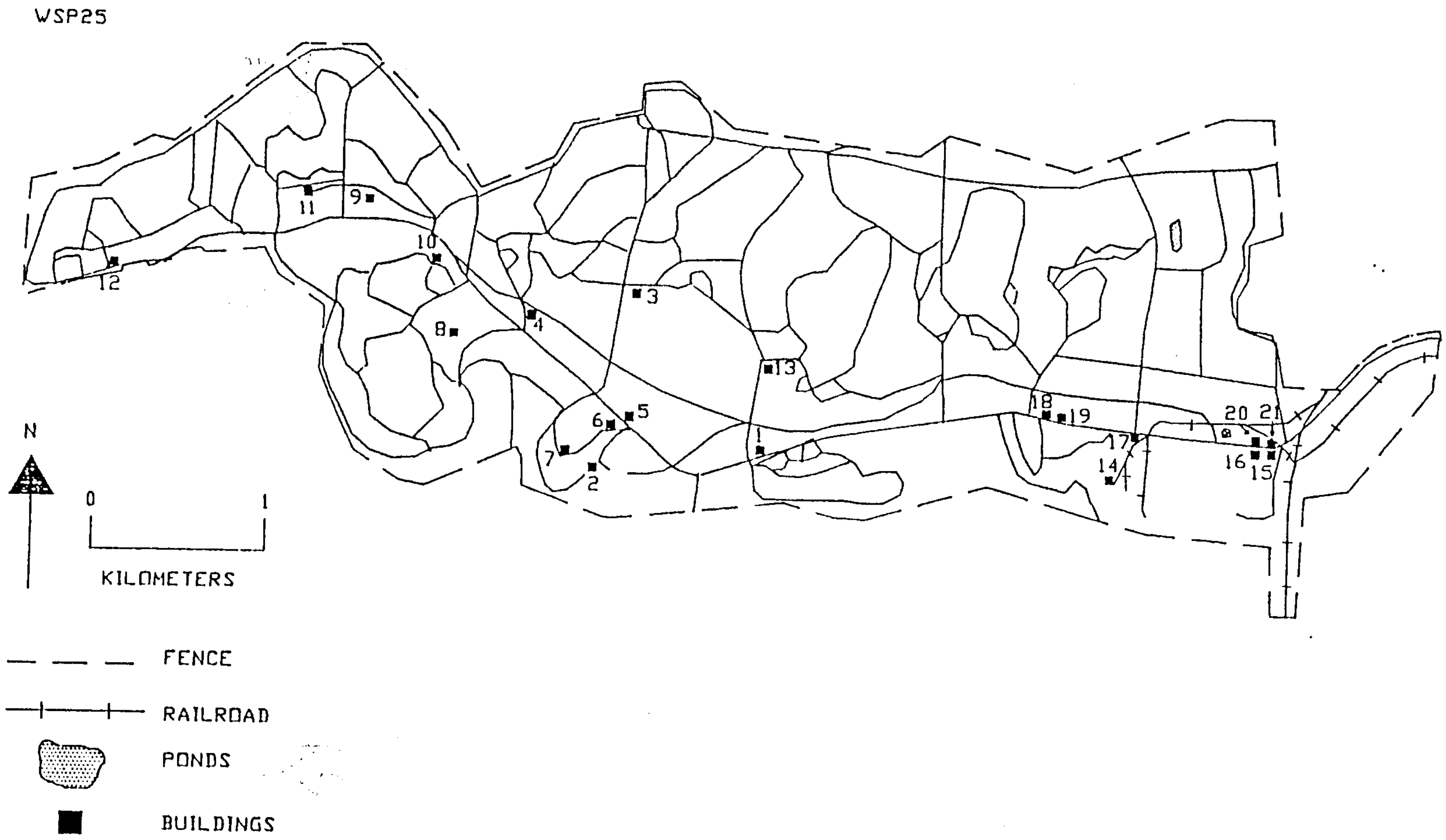

FIGURE 5: Location of Buildings on Army Reserve Property.

WSP17

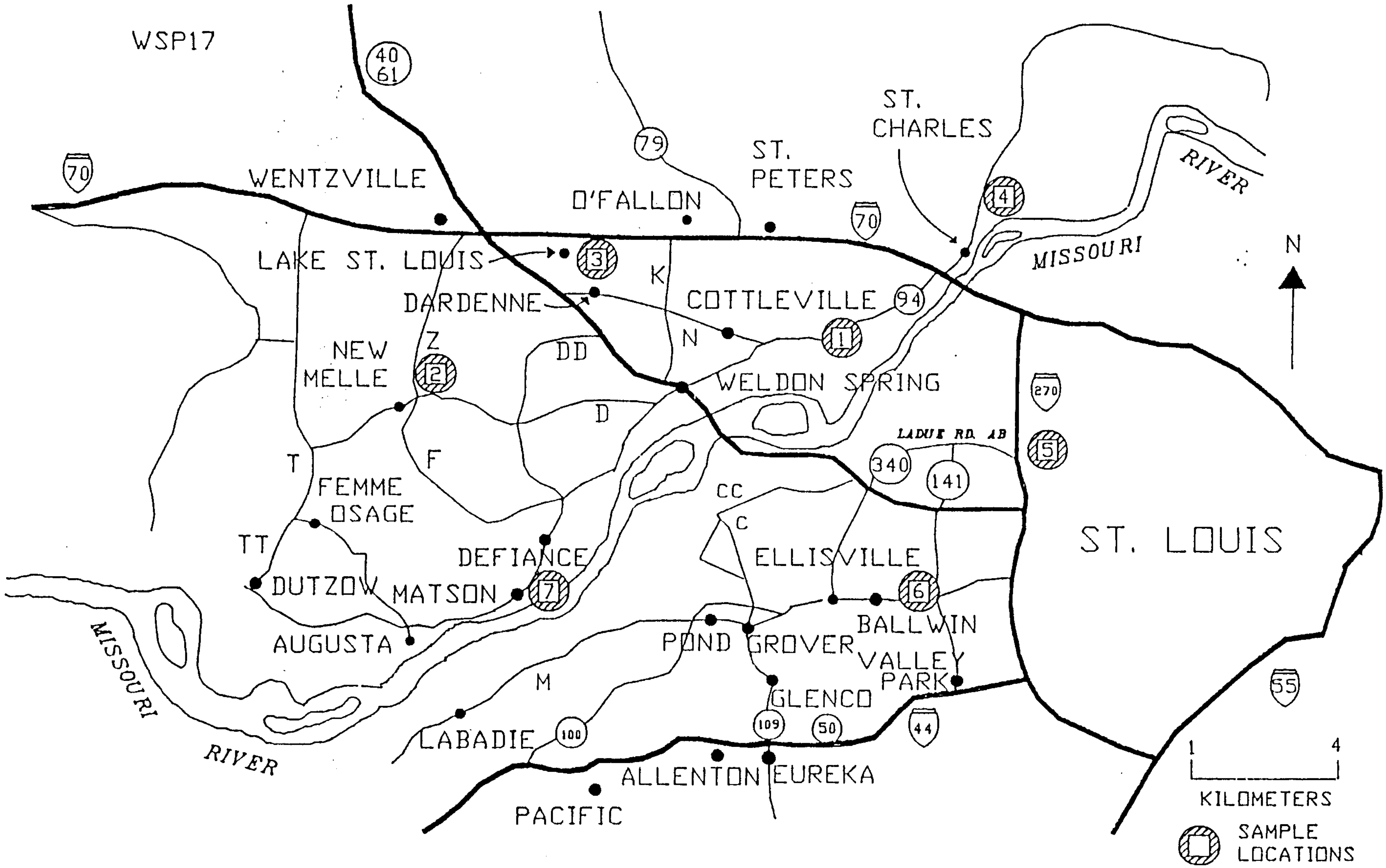

FIGURE 6: Map of St. Louis Area Showing Locations of Background Measurements and Baseline Samples.

WSP20

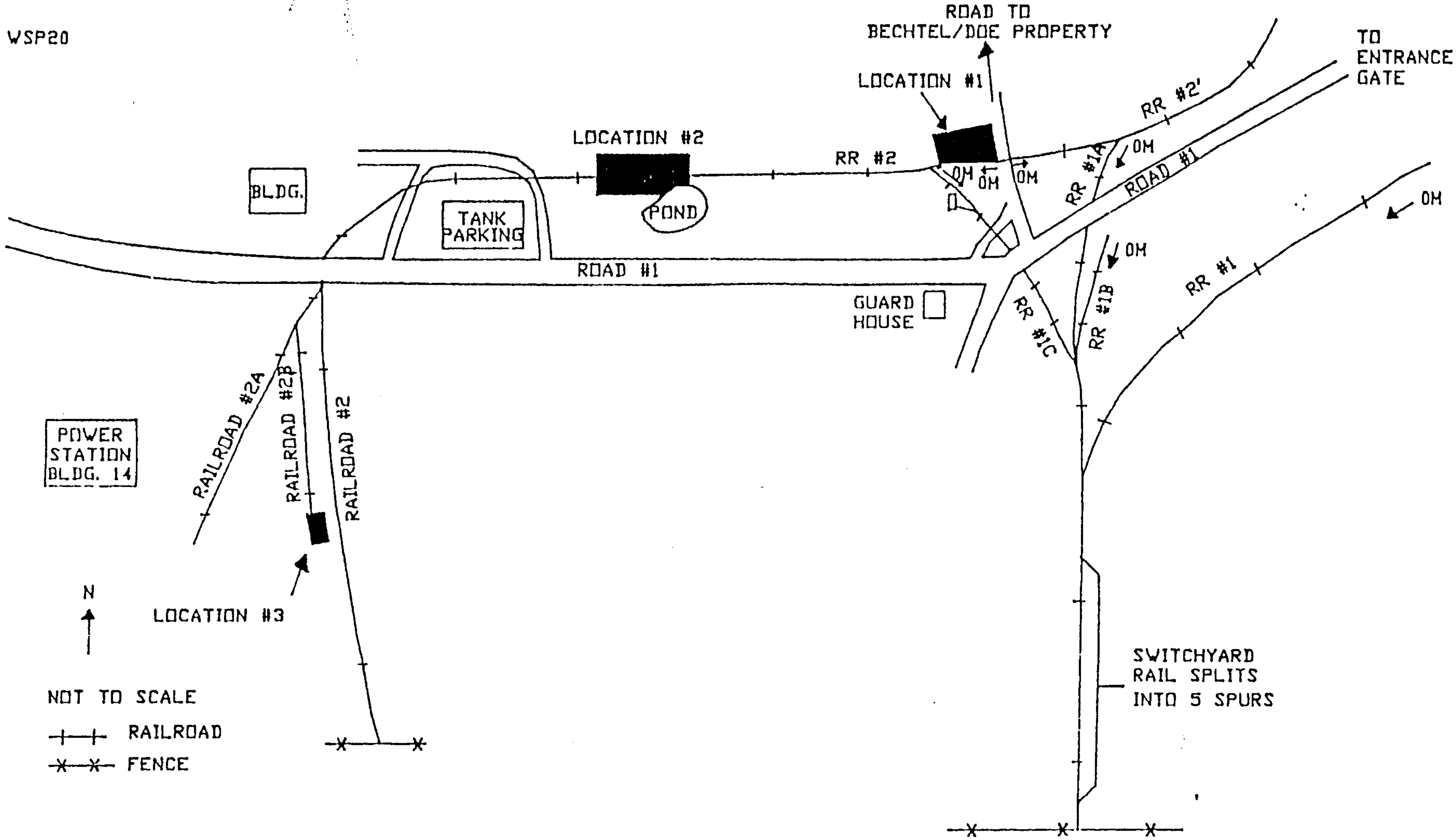

FIGURE 7: Location of Army Railroad #1, #1A, #1B, #1C, #2, #2A, #2B, and #2'.

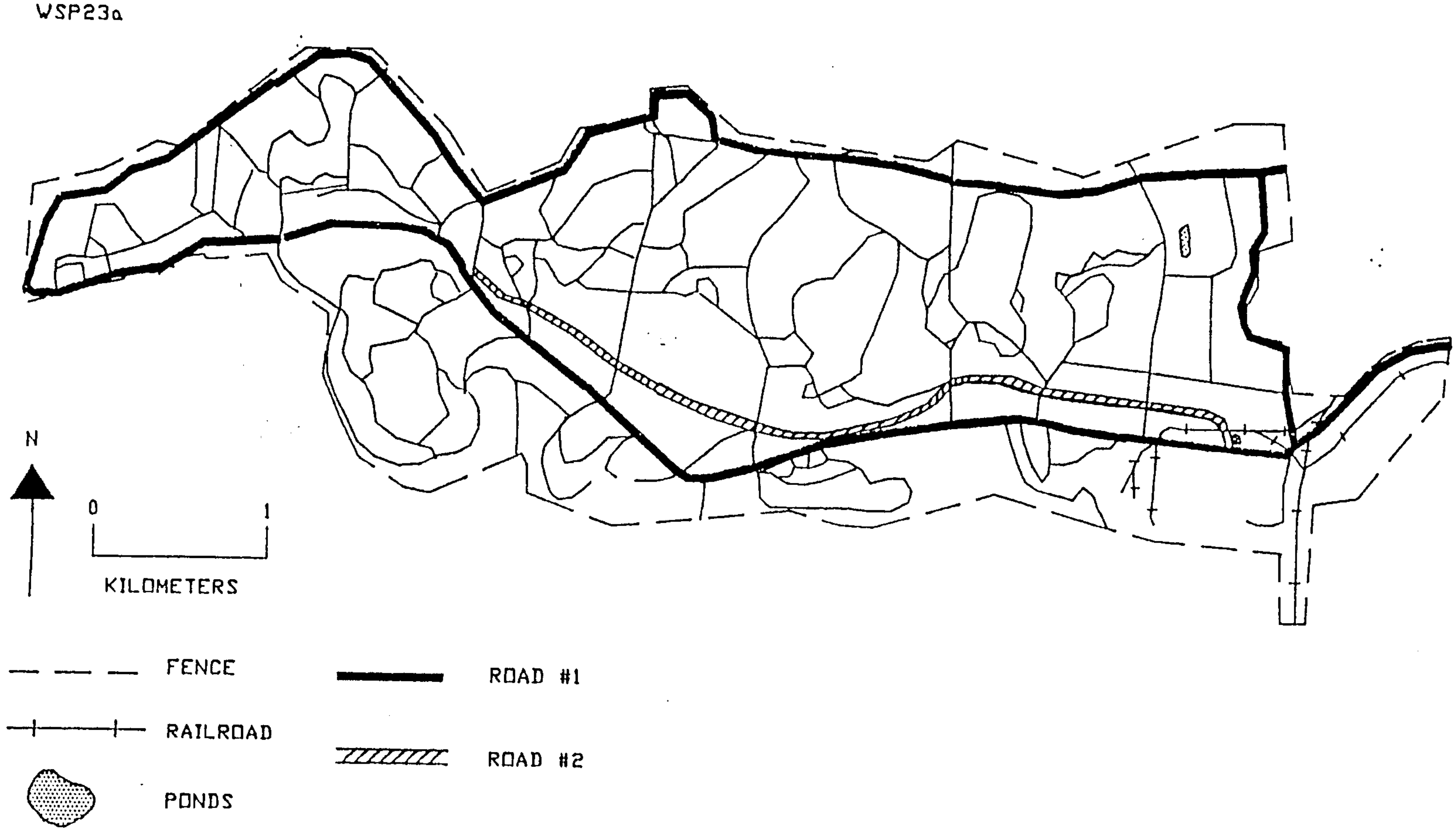

FIGURE 8: Location of Major Roadways on Army Reserve Property.

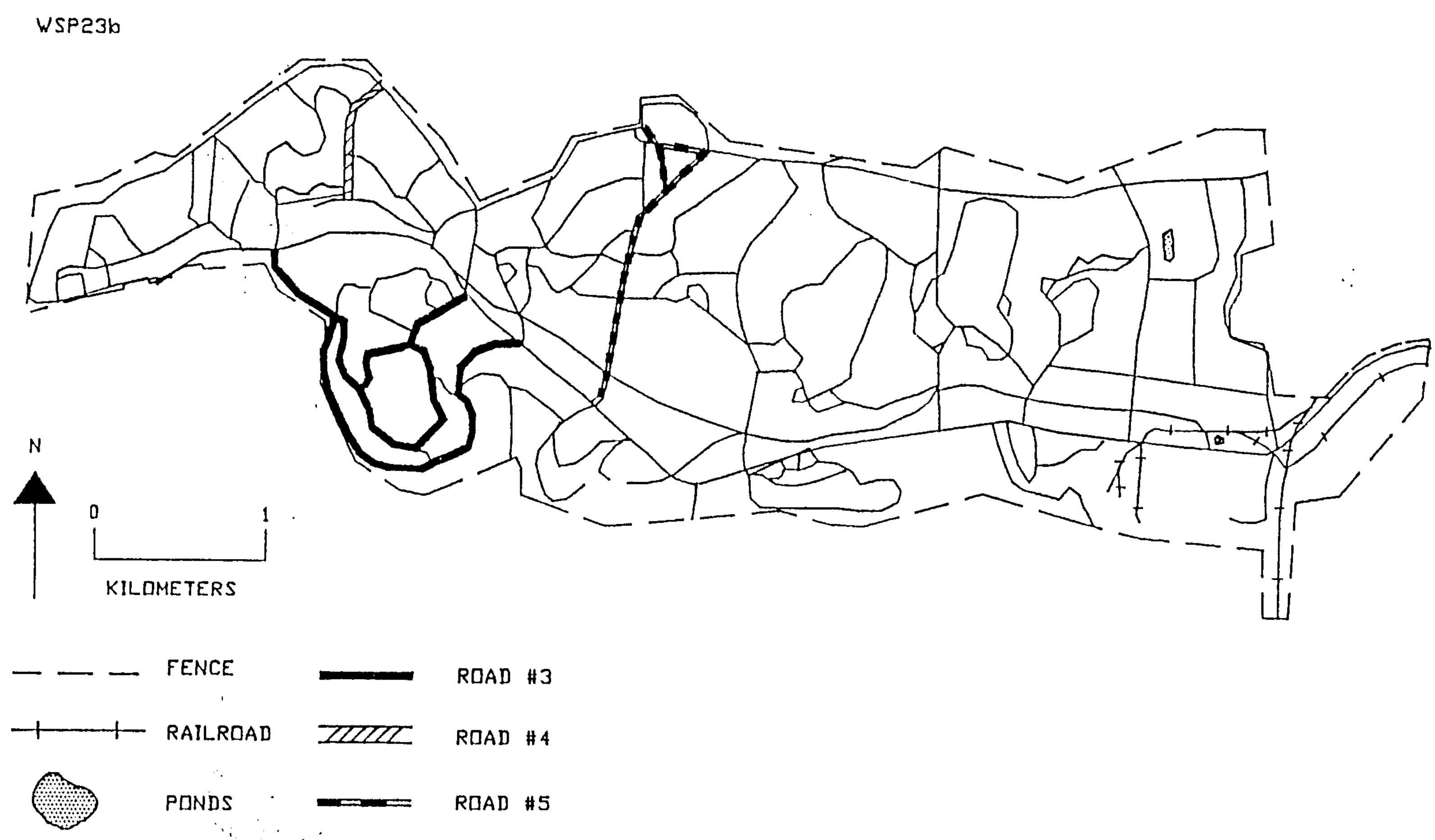

FIGURE 9: Location of Major Roadways on Army Reserve Property.

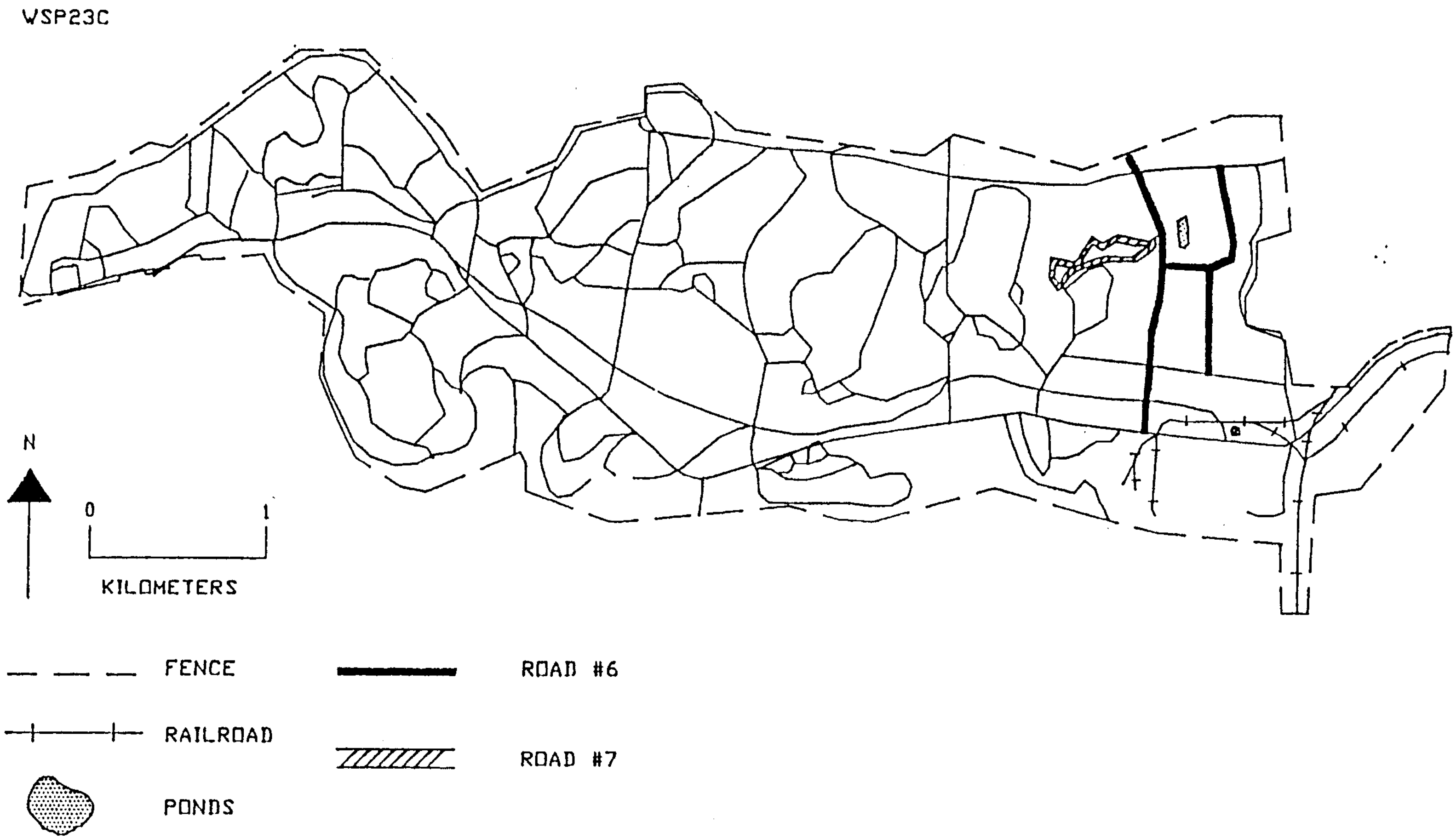

FIGURE 10: Location of Major Roadways on Army Reserve Property.

WSP26

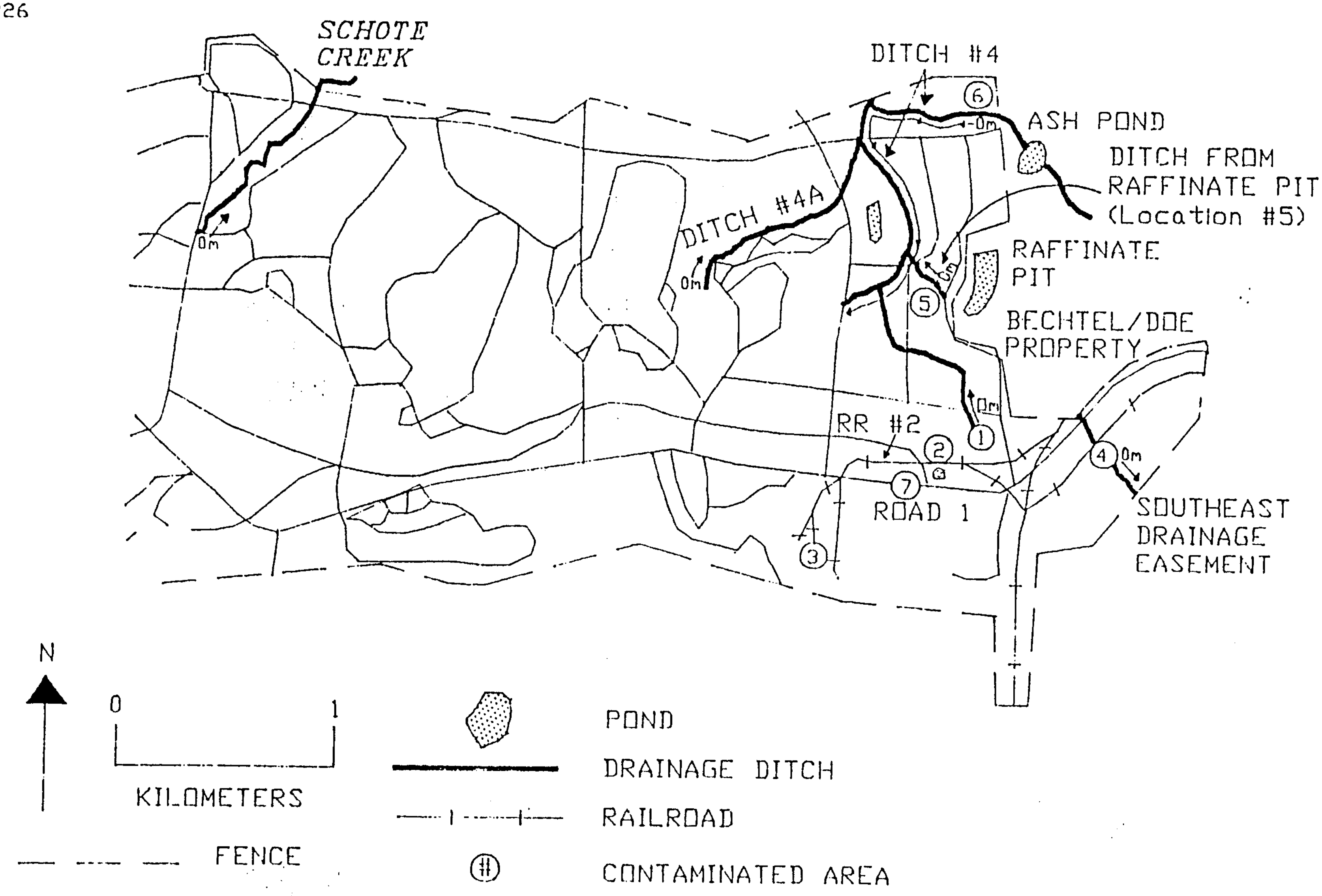

FIGURE 11: Location of Contaminated Areas On Army Reserve Property.

WSP22

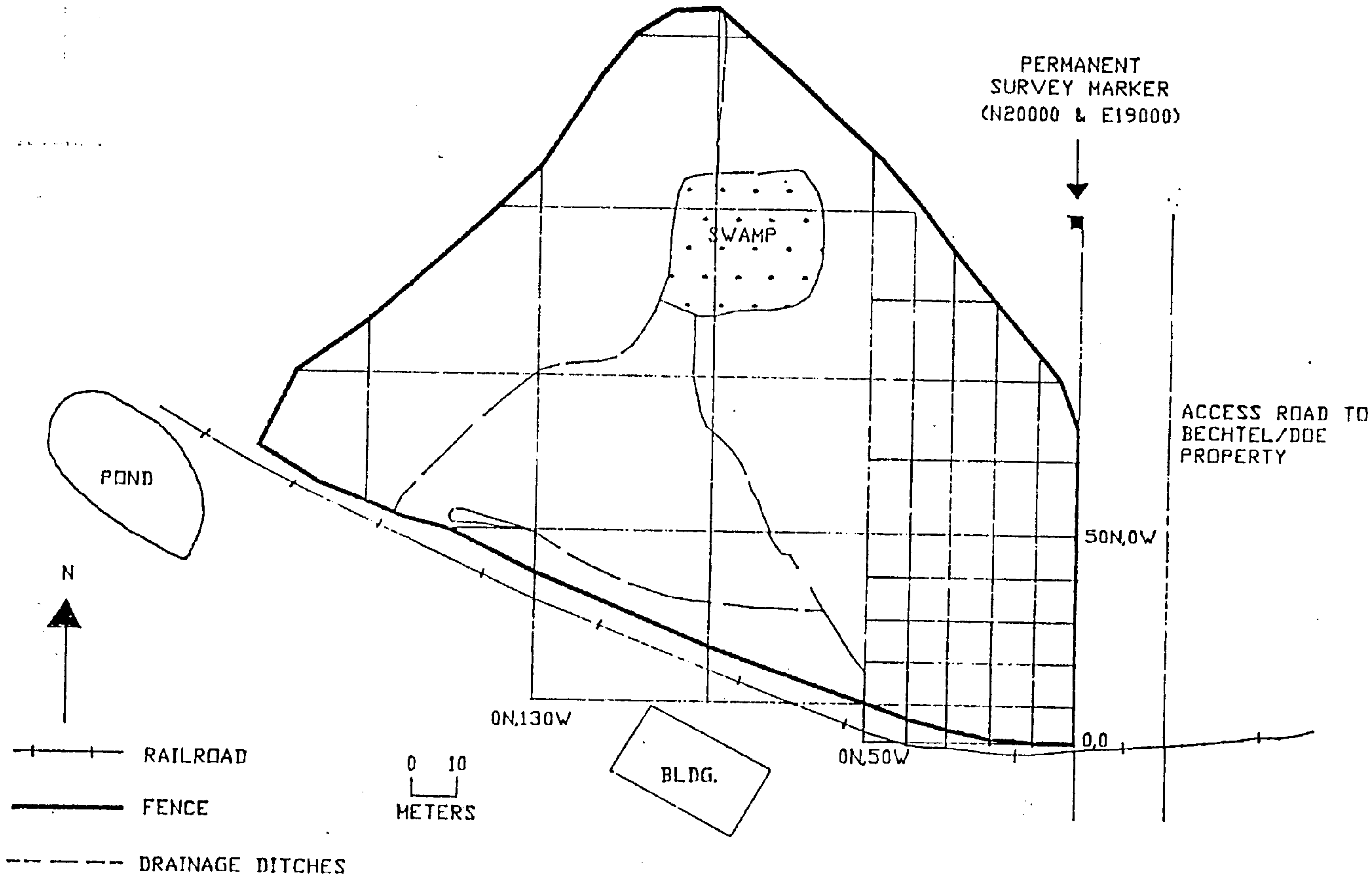

FIGURE 12: Location #1--Grid Established for Survey Reference.

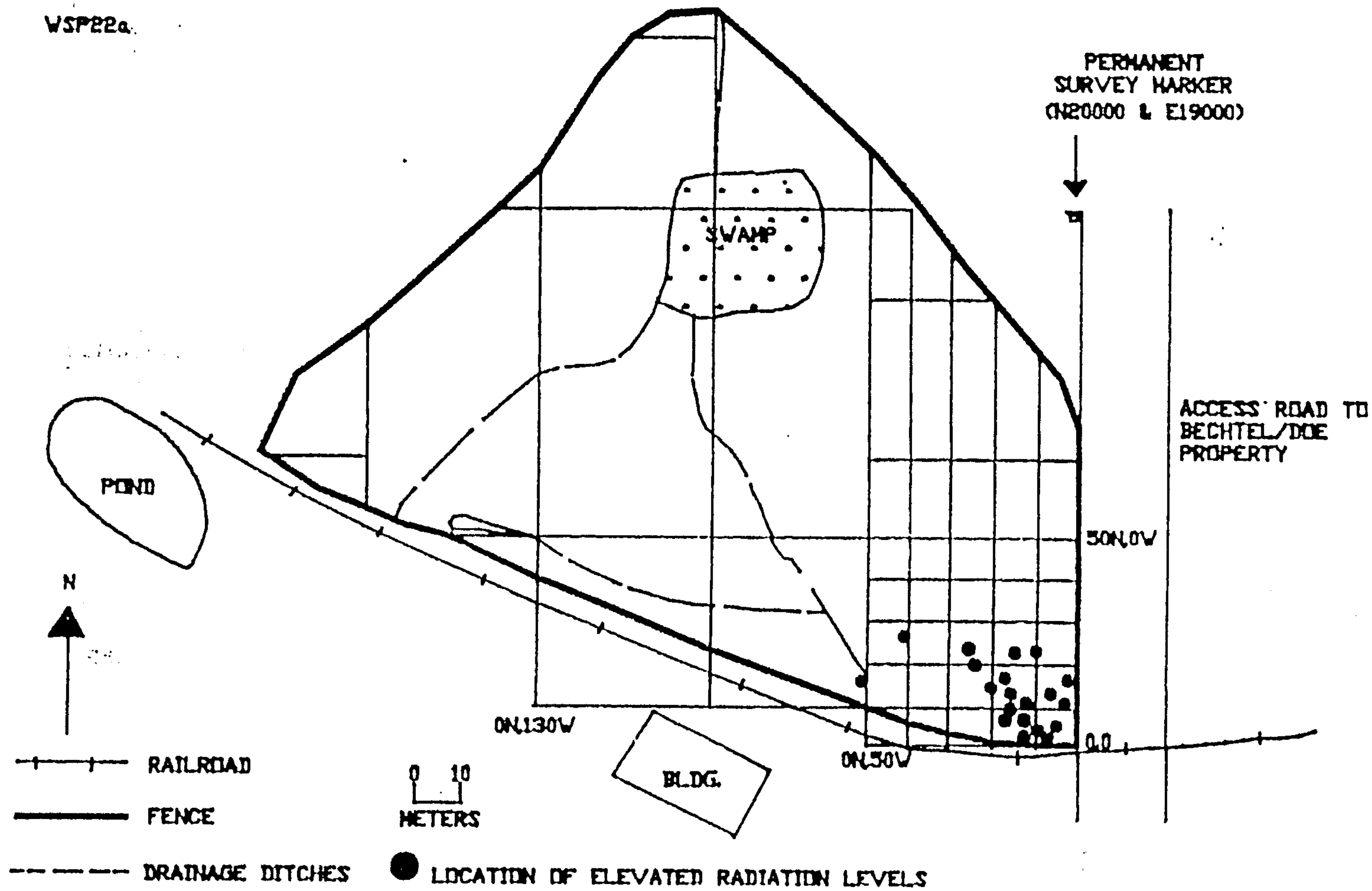

FIGURE 13: Location #1--Locations of Elevated Radiation Identified by Surface Scanning.

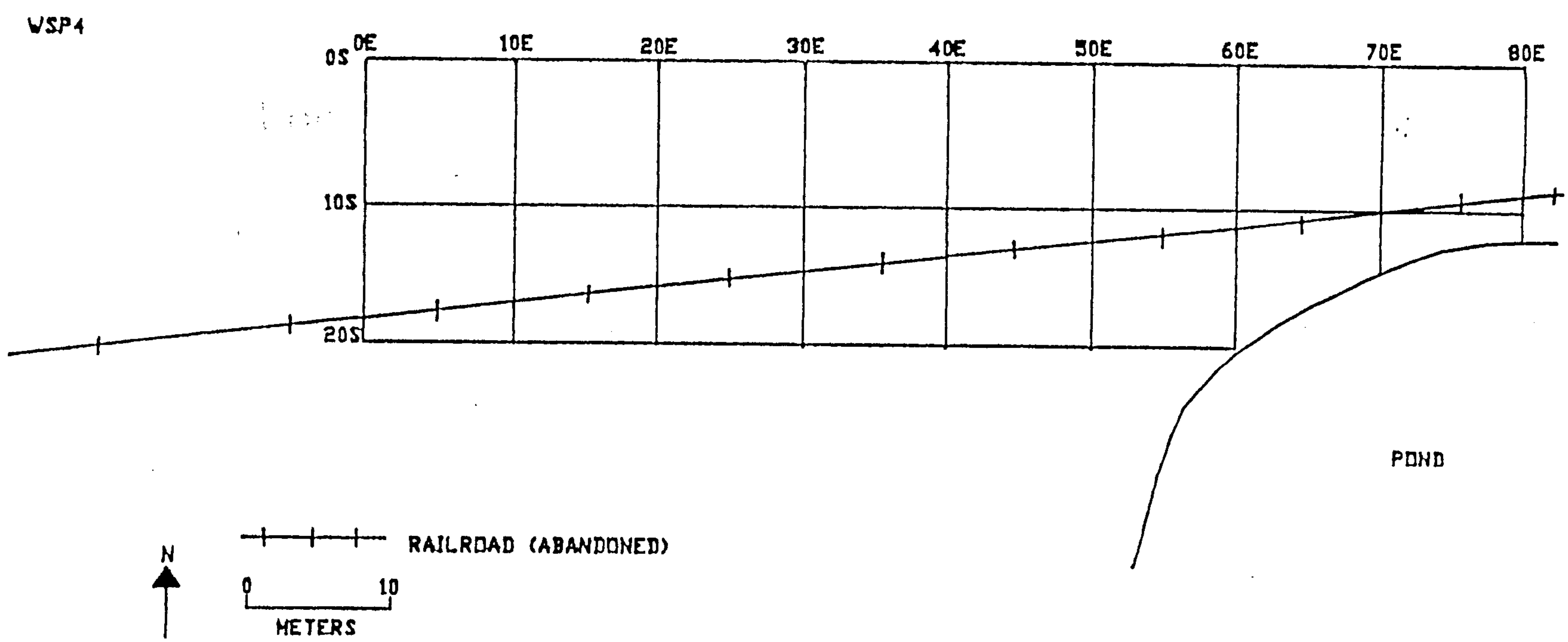

FIGURE 14: Location #2--Grid Established for Survey Reference.

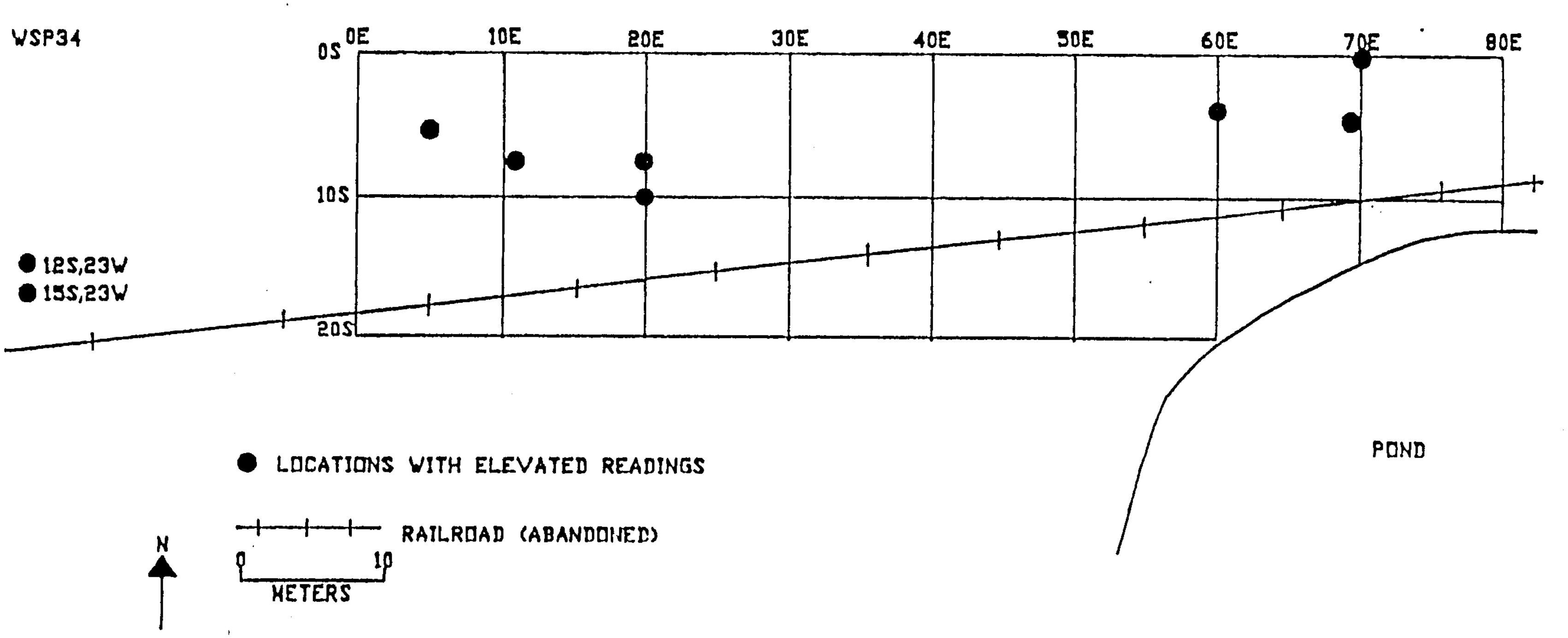

FIGURE 15: Location #2--Locations of Elevated Radiation Identified by the Walkover Scan and Systematic Soil Sampling.

WSP35

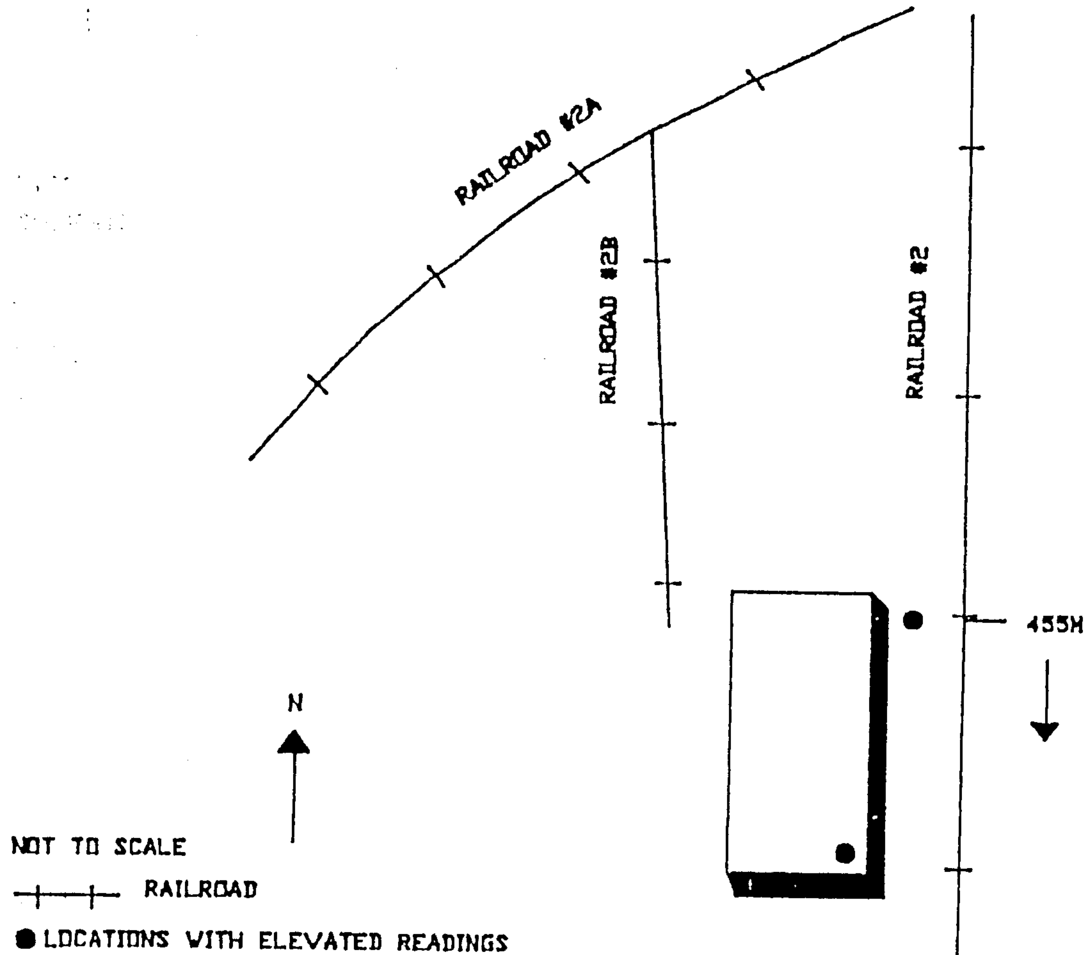

FIGURE 16: Location #3--Loading Dock Area Indicating Locations of Elevated Radiation Identified by the Walkover Scan.

WSP37A

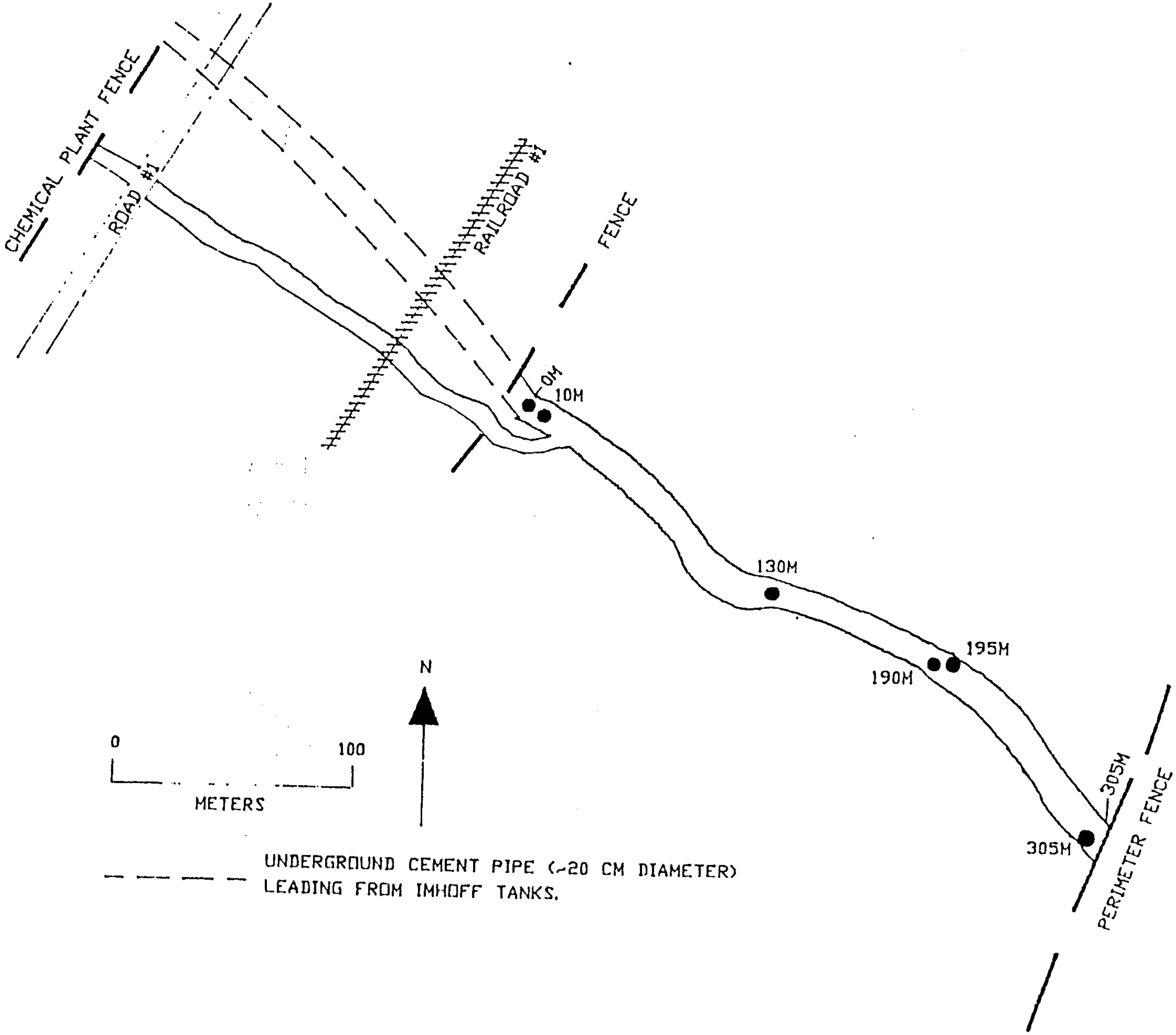

FIGURE 17: Location #4--Southeast Drainage Easement Indicating the Reference Grid and Locations of Elevated Radiation Identified by the Walkover Scan.

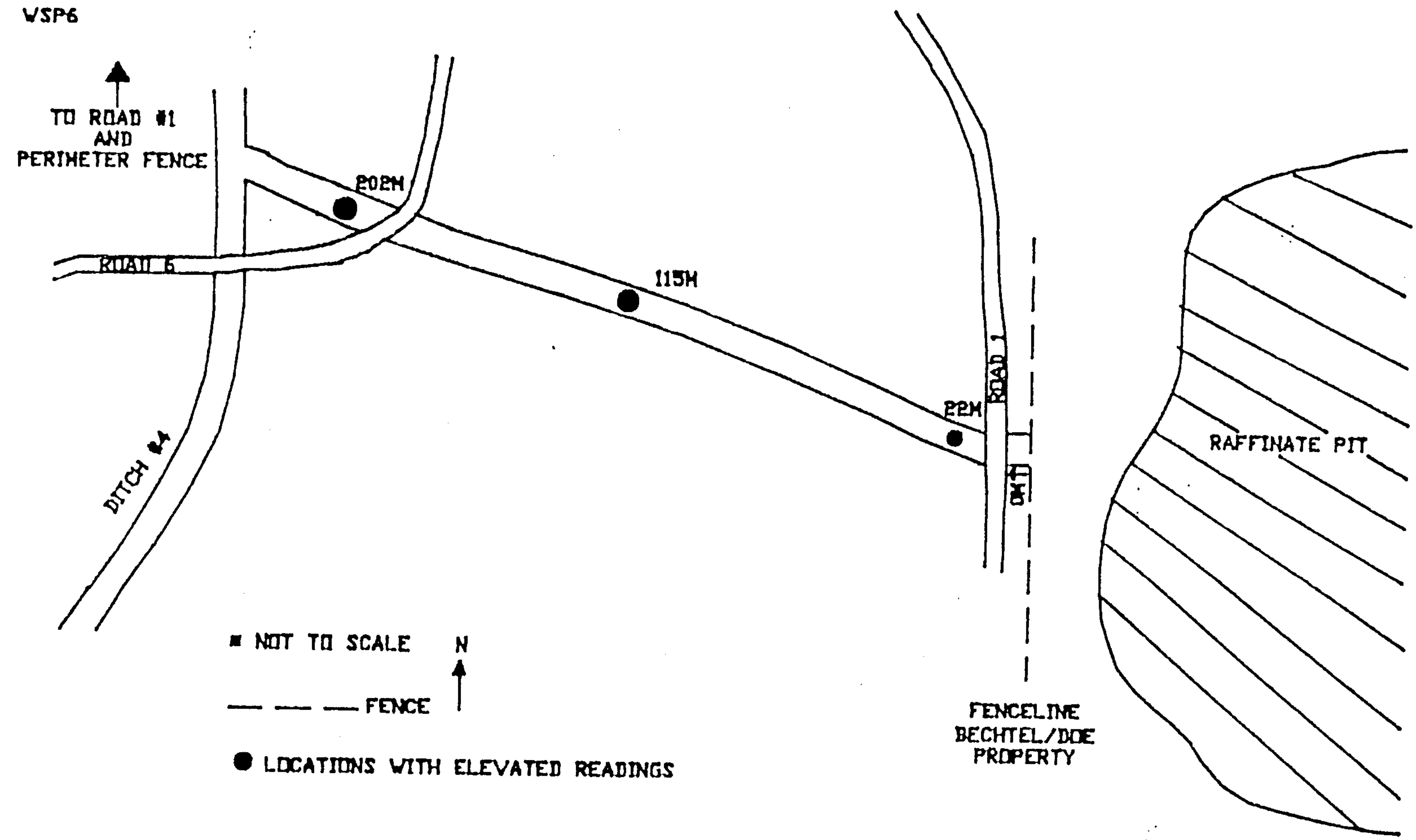

FIGURE 18: Location #5--Drainage Ditch from DOE Raffinate Pit Indicating the Reference Grid and Locations of Elevated Radiation Identified by the Walkover Scan.

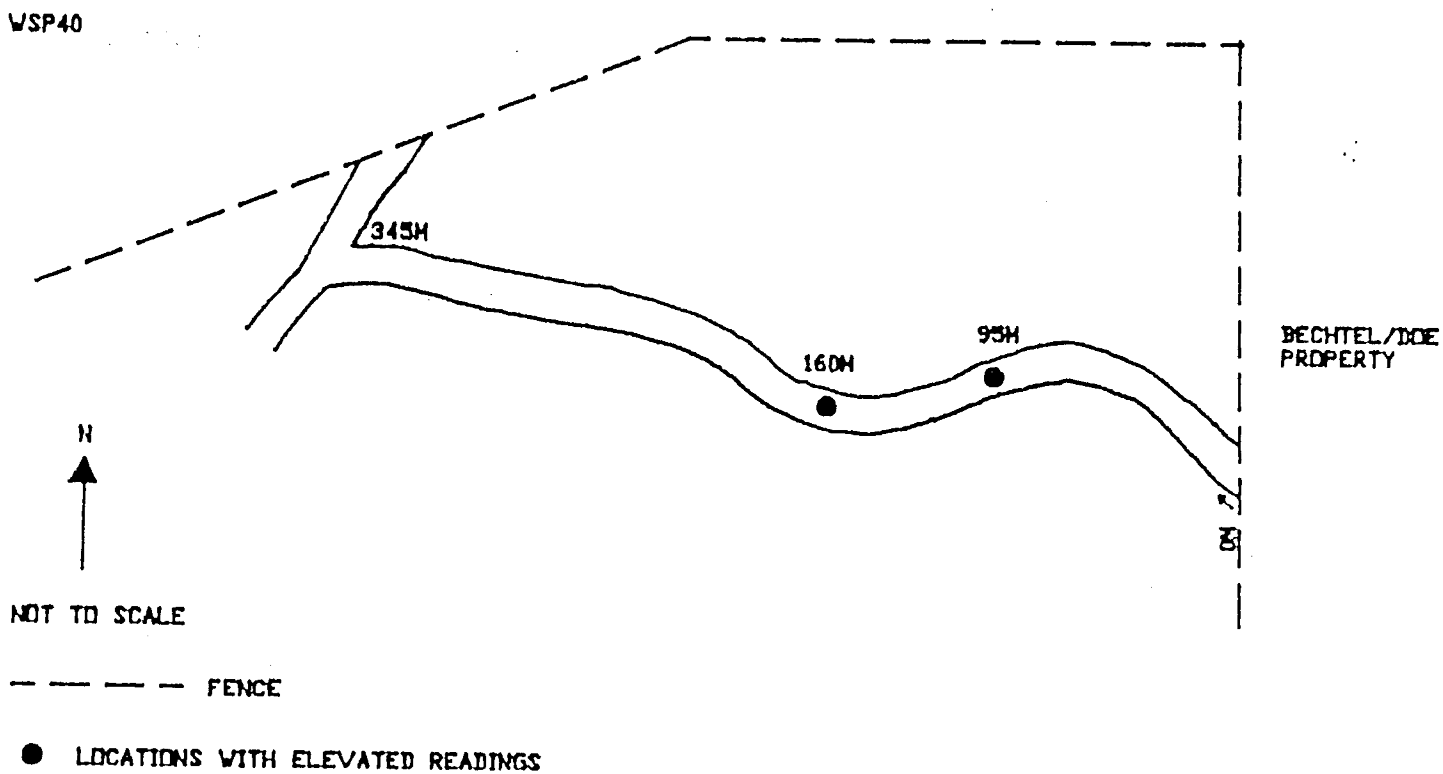

FIGURE 19: Location #6--Drainage Ditch from Ash Pond Indicating Locations of Elevated Radiation Identified by the Walkover Scan.

WSP42

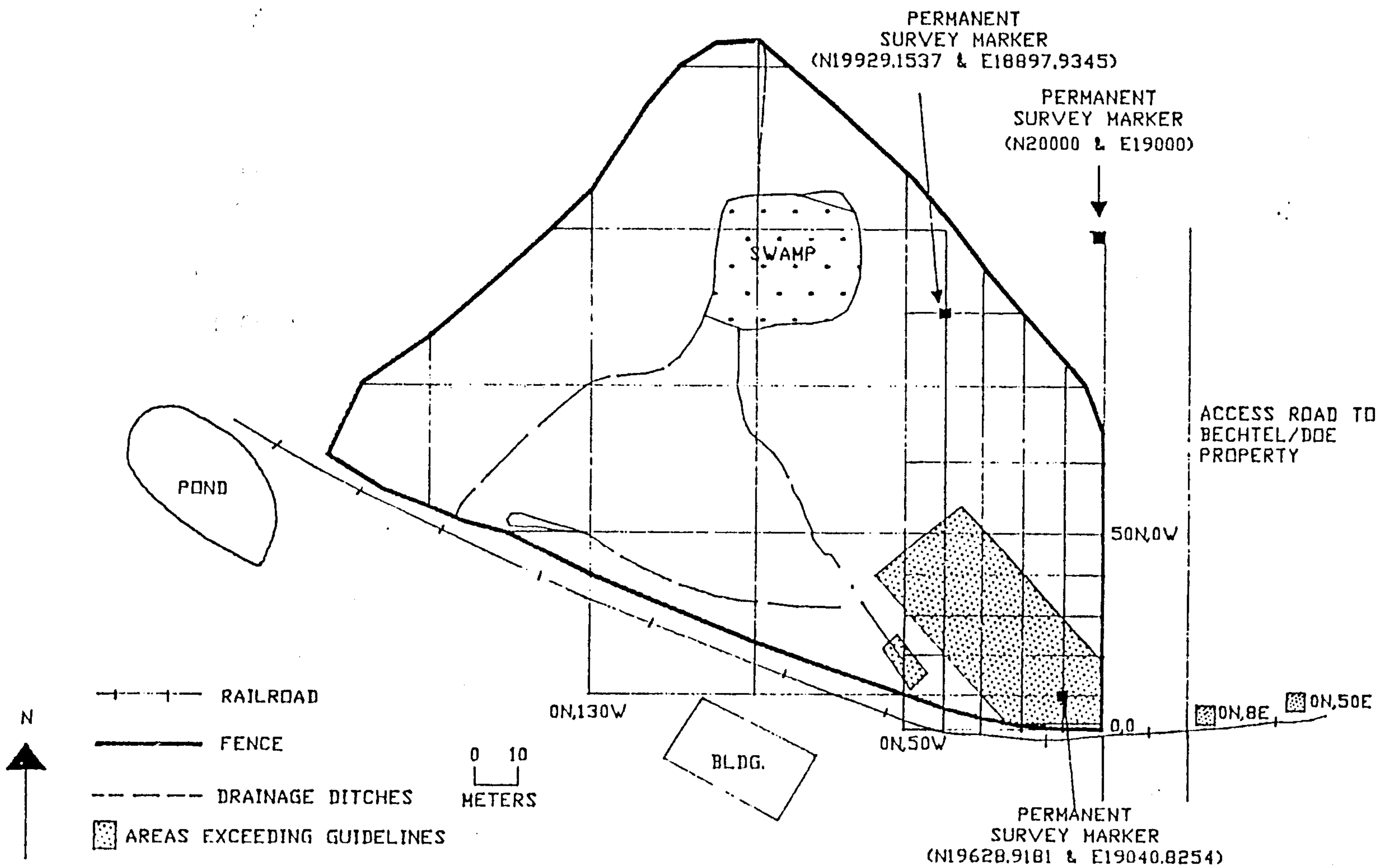

FIGURE 20: Location #1--Areas Which Exceed the DOE Guidelines.

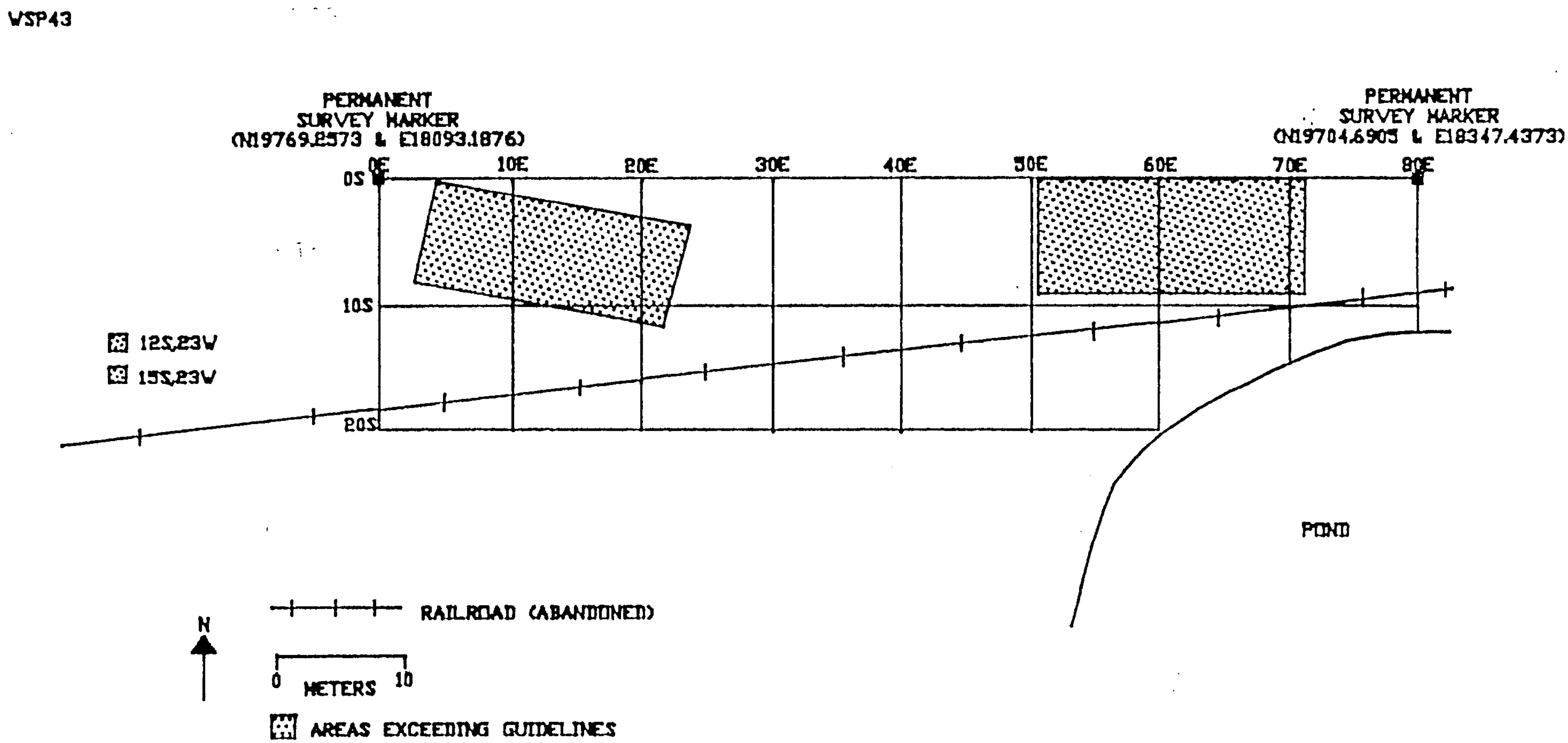

FIGURE 21: Location #2--Areas Which Exceed the DOE Guidelines.

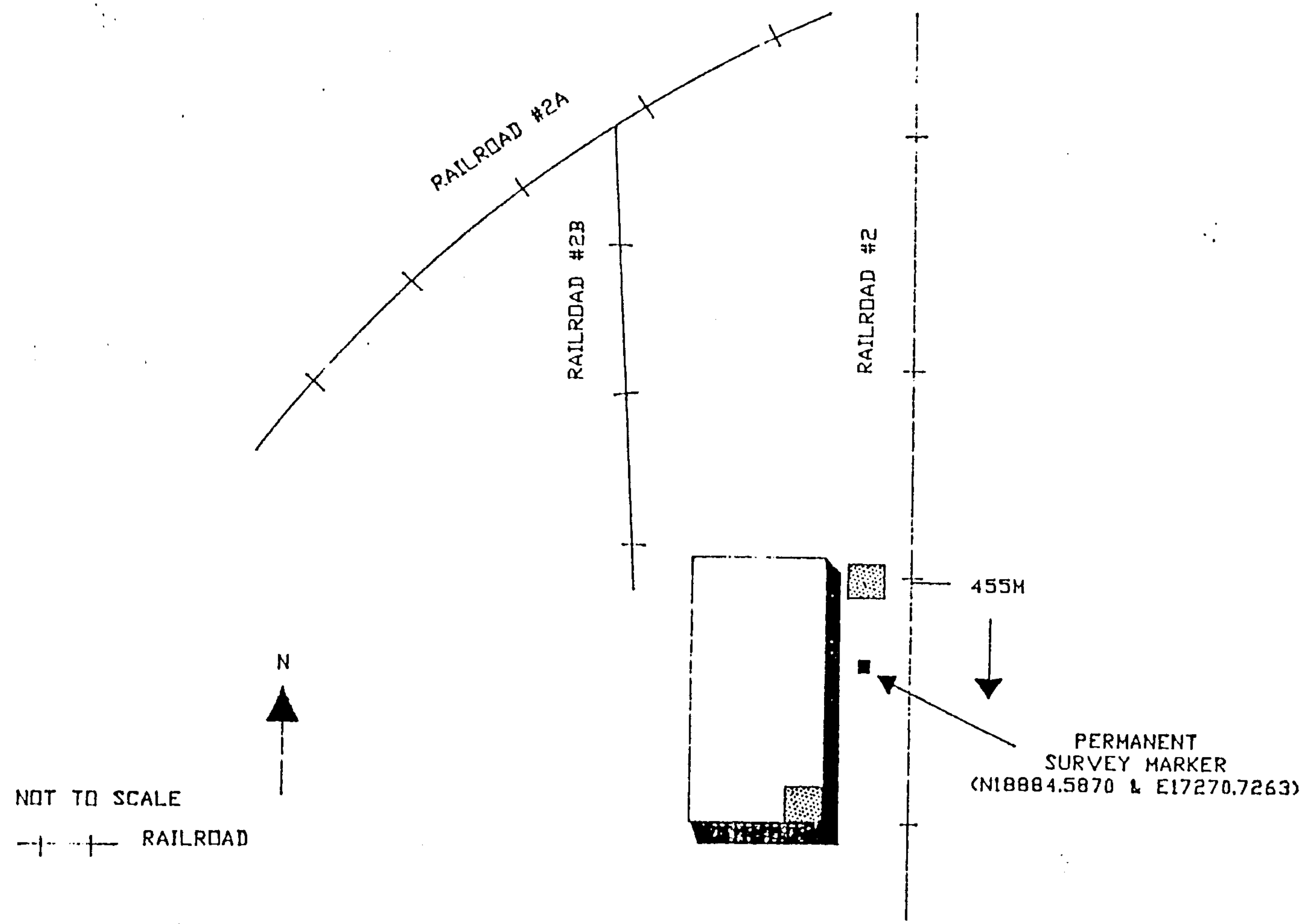

FIGURE 22: Location #3--Loading Dock Areas Which Exceed the DOE Guidelines.

WSP38A

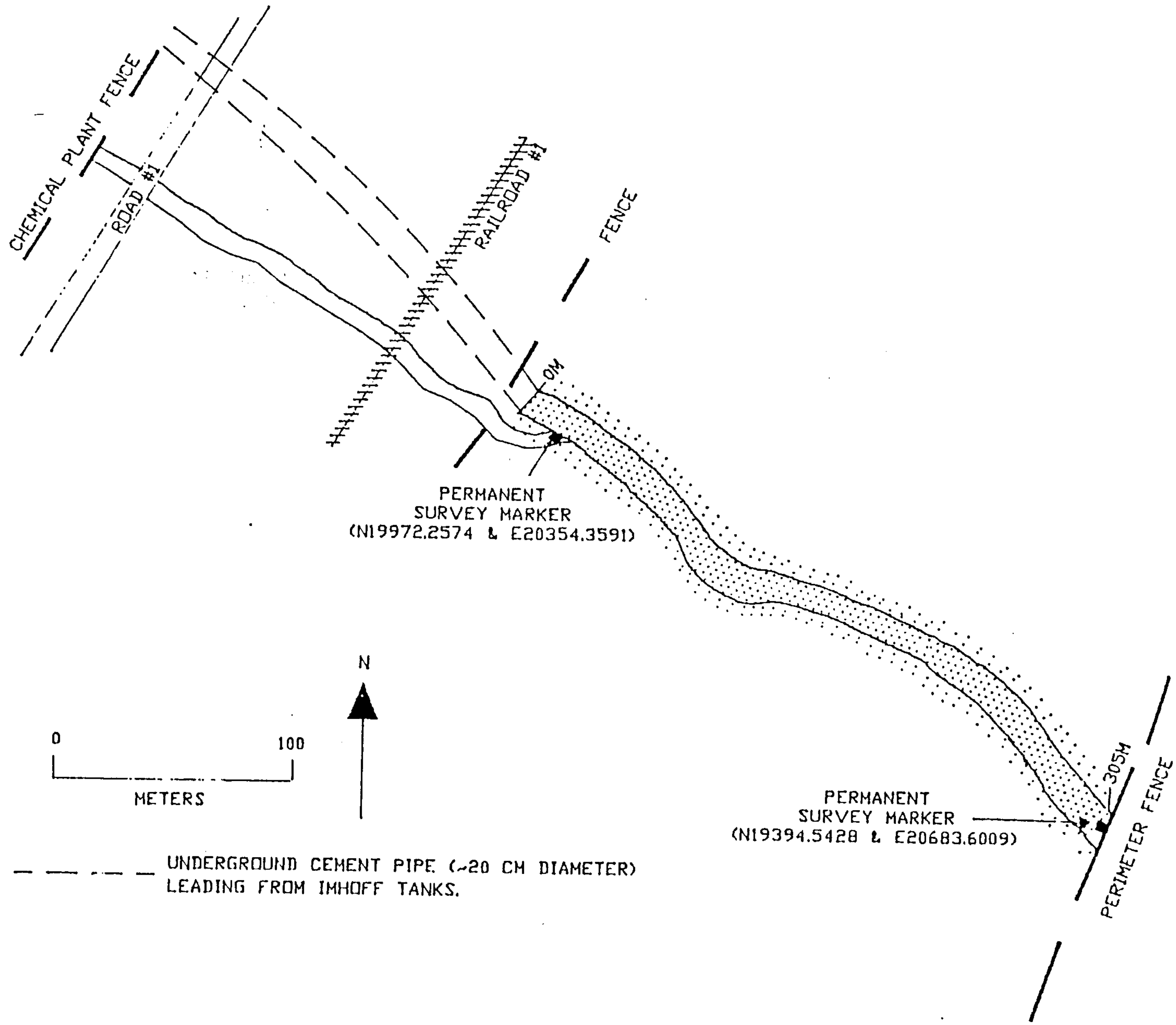

FIGURE 23: Location #4---Southeast Drainage Easement Area Which Exceeds the DOE Guidelines.

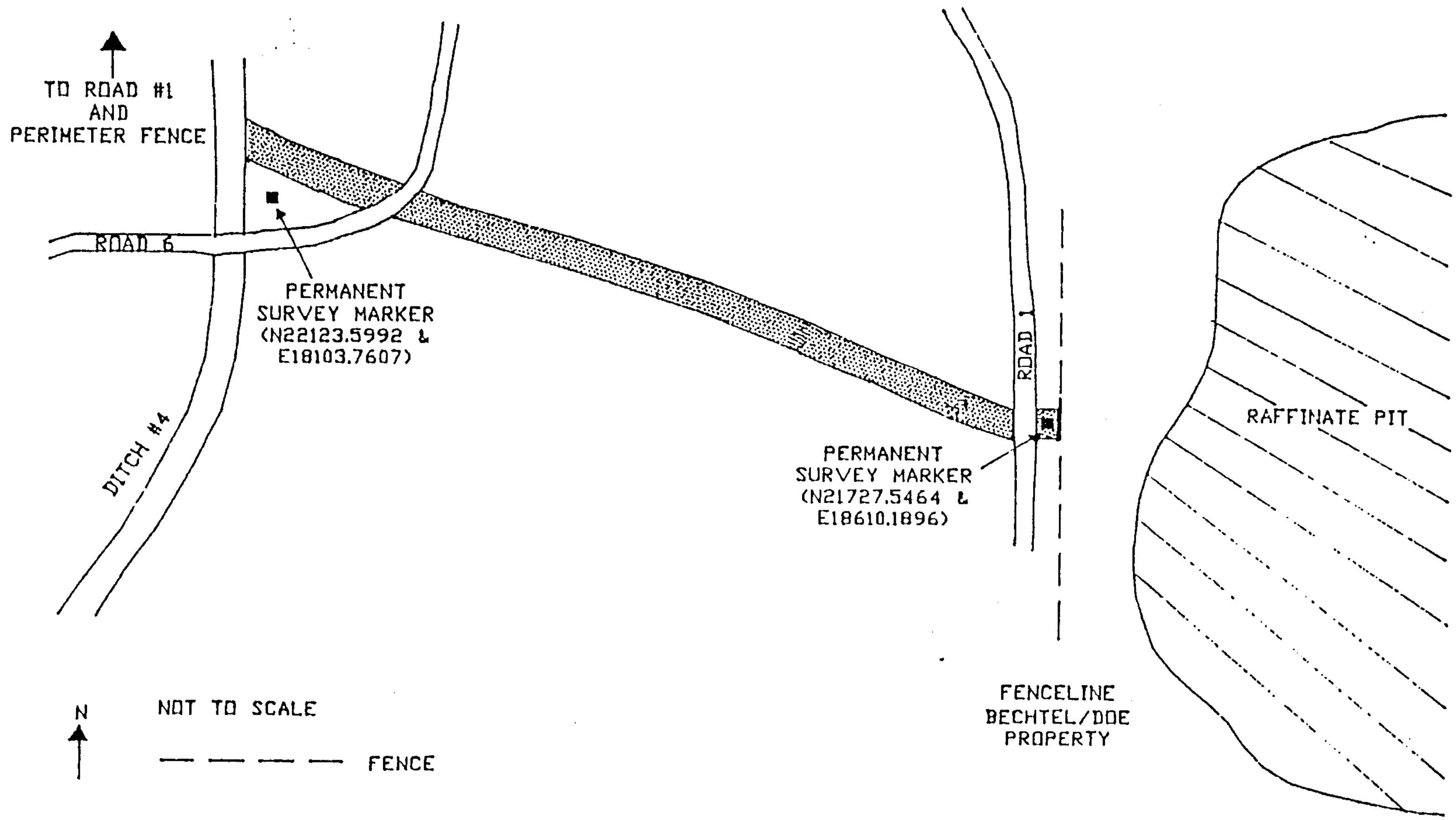

FIGURE 24: Location #5--Area Along the Drainage Ditch from the Raffinate Pit Which Exceeds DOE Guidelines.

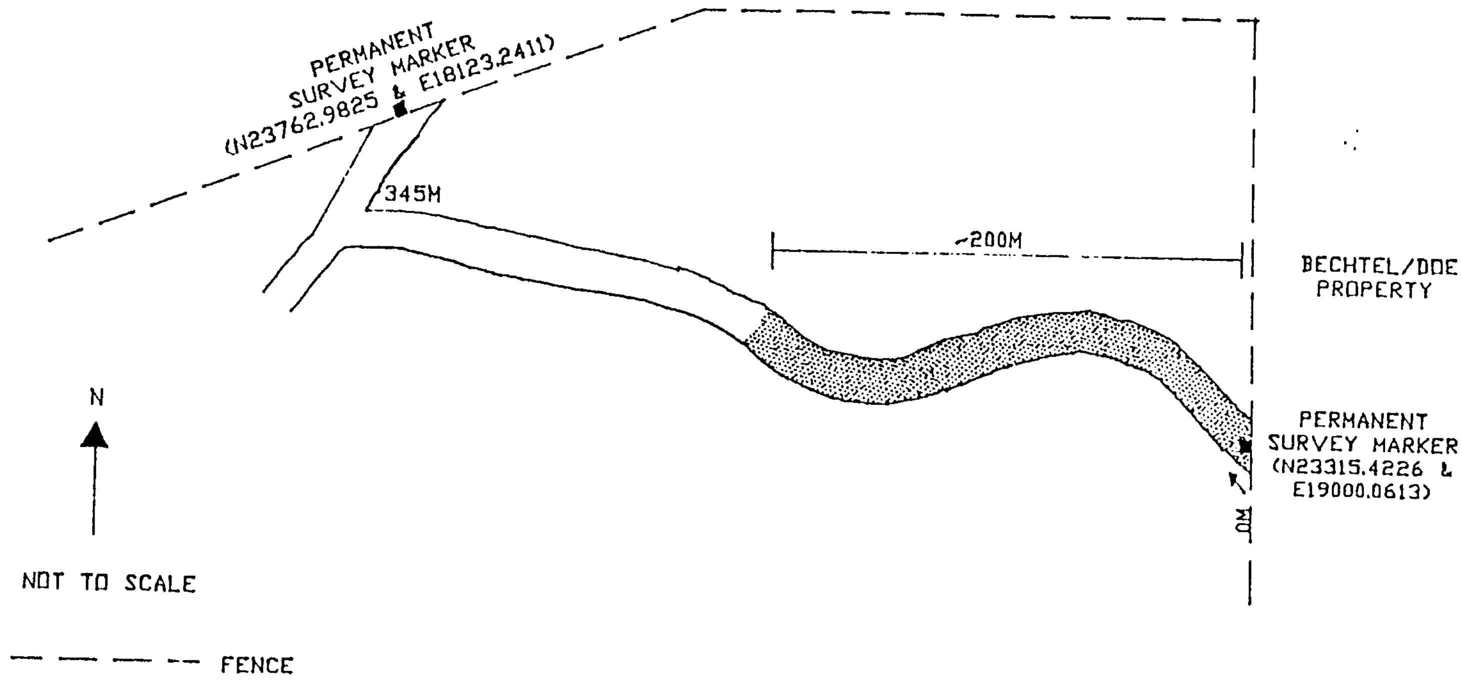

FIGURE 25: Location #6--Area Along the Ash Pond Drainage Ditch Which Exceeds DOE Guidelines.

TABLE 1A

BACKGROUND EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN BASELINE SOIL SAMPLES
WELDON SPRING, MISSOURI

Location[a]	Exposure Rate[b] (μR/h)	Radionuclide Concentrations (pCi/g)		
		Ra-226	U-238	Th-232
1	7	0.89 ± 0.13[c]	<0.86	1.48 ± 0.21
2	7	0.55 ± 0.13	<0.68	0.97 ± 0.17
3	5	0.71 ± 0.08	1.33 ± 0.74	1.19 ± 0.22
4	7	0.98 ± 0.15	0.87 ± 0.69	0.95 ± 0.26
5	8	0.92 ± 0.12	1.52 ± 0.83	1.48 ± 0.28
6	7	0.69 ± 0.15	1.62 ± 0.99	1.36 ± 0.32
7	6	—[d]	—	—

[a]Refer to Figure 6.
[b]Measured at 1 m above the surface.
[c]Errors are 2σ based on counting statistics.
[d]Dash indicates no sample collected.

TABLE 1B

RADIONUCLIDE CONCENTRATIONS IN BASELINE SEDIMENT SAMPLES
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
2	0.73 ± 0.15[b]	<0.83	1.02 ± 0.19
3	0.35 ± 0.06	0.50 ± 0.31	0.24 ± 0.07
4	0.92 ± 0.12	1.38 ± 0.93	0.89 ± 0.20
6	0.62 ± 0.09	<0.60	0.87 ± 0.13
7	0.91 ± 0.09	1.44 ± 0.39	1.02 ± 0.18

[a]Refer to Figure 6.
[b]Errors are 2σ based on counting statistics.

TABLE 1C

RADIONUCLIDE CONCENTRATIONS IN BASELINE WATER SAMPLES
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
2	0.86 ± 0.53[b]	3.68 ± 0.95
3	1.05 ± 0.54	4.61 ± 0.99
4	3.19 ± 0.96	7.39 ± 1.13
5	0.48 ± 0.44	3.75 ± 0.94
6	1.02 ± 0.53	3.50 ± 0.94
7	4.09 ± 1.06	6.71 ± 1.11

[a]Refer to Figure 6.
[b]Errors are 2σ based on counting statistics.

TABLE 2

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
RAILROAD #1
WELDON SPRING, MISSOURI

Location[a] (m)			Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
Main Line				
(#1)	0	C	8	8
	100	L	7	7
	200	R	7	7
	300	L	7	7
	400	L	7	7
	500	R	7	7
	600	C	7	7
	700	L	8	8
	800	R	7	7
	900	C	6	6
#1A	0	L	6	6
	100	R	7	6
	200	C	6	6
	300	L	6	6
	350	R	6	6
#1B	0	C	6	6
	100	R	6	6
	127	L	6	6
#1C	0	L	6	6
	100	R	6	6
	200	L	6	6
	300	R	6	6
Switchyard				
(Spurs)	100	R	6	6
	200	L	6	6
	300	R	6	6
	400	L	6	6
	500	R	6	6
	524	L	6	6

[a]Refer to Figure 7.

TABLE 3

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
RAILROAD #2
WELDON SPRING, MISSOURI

Location[a] (m)			Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
Main Line (#2)	100	L	7	8
	200	C	6	6
	300	R	7	7
	400	L	6	6
	500	L	6	6
	600	R	6	6
	630	C	6	6
#2A	0	C	6	6
	100	2L	6	7
	200	R	6	6
	300	C	7	6
#2B	0	R	6	6
	100	L	6	6
#2'	0	L	9	11
	0	R	8	8
	50	L	9	13
	50	R	8	9
	100	L	8	10
	100	R	7	6
	150	L	8	9
	150	R	8	8
	200	L	7	8
	200	R	8	9
	207	L	7	7
	207	R	7	8

[a]Refer to Figure 7.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS - RAILROAD #1
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
Mainline			
0, C	1.34 ± 0.34[b]	8.22 ± 3.16	1.27 ± 0.58
100, L	0.91 ± 0.32	<0.65	<0.20
200, R	0.95 ± 0.36	1.12 ± 1.30	<0.18
300, L	0.50 ± 0.31	1.33 ± 1.54	<0.15
400, L	0.83 ± 0.20	<0.70	0.28 ± 0.27
500, R	0.77 ± 0.29	<0.87	1.10 ± 0.50
600, C	0.74 ± 0.33	<0.79	<0.23
700, L	0.92 ± 0.21	2.28 ± 1.93	1.14 ± 0.35
800, R	0.50 ± 0.29	1.27 ± 1.97	<0.19
900, C	0.88 ± 0.32	1.12 ± 1.40	<0.13
Railroad #1A			
0, L	0.97 ± 0.28[b]	<0.75	<0.20
100, R	0.76 ± 0.41	<0.68	<0.20
200, C	0.81 ± 0.27	<0.58	<0.22
300, L	0.66 ± 0.32	1.19 ± 1.32	<0.16
350, R	1.45 ± 0.31	<0.62	<0.20
Railroad #1B			
0, C	0.29 ± 0.21[b]	<0.57	0.27 ± 0.20
100, R	0.41 ± 0.27	0.82 ± 1.52	<0.18
127, L	0.91 ± 0.31	<0.67	<0.11
Railroad #1C			
0, L	0.46 ± 0.22[b]	<0.62	<0.16
100, R	0.34 ± 0.15	<0.41	0.24 ± 0.17
200, L	0.57 ± 0.23	<0.66	<0.16
300, R	1.58 ± 1.82	1.44 ± 0.81	<0.21
Switchyard Spur A			
100, R	0.83 ± 0.28[b]	<0.73	0.50 ± 0.28
200, L	0.77 ± 0.41	1.38 ± 1.45	<0.19
300, R	0.77 ± 0.30	<0.72	<0.18
400, L	0.93 ± 0.29	1.72 ± 1.29	<0.18
500, R	0.88 ± 0.28	<0.67	<0.43
524, L	0.75 ± 0.46	<0.64	<0.28
Switchyard Spur B			
100, R	0.97 ± 0.37[b]	0.92 ± 1.53	<0.21
200, L	1.09 ± 0.35	1.60 ± 1.39	<0.18
300, R	1.06 ± 0.37	1.78 ± 1.57	<0.17
400, L	0.84 ± 0.28	<0.78	<0.21

TABLE 4 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS - RAILROAD #1
WELDON SPRING, MISSOURI

Location	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
Switchyard Spur C			
100, R	0.75 ± 0.31[b]	<0.68	<0.21
200, L	0.57 ± 0.29	<0.67	<0.19
300, R	0.53 ± 0.20	1.49 ± 0.93	<0.23
400, L	0.87 ± 0.34	1.79 ± 1.20	<0.24
Switchyard Spur D			
100, R	0.76 ± 0.41[b]		
200, L	0.48 ± 0.39	<0.76	<0.23
300, R	0.54 ± 0.21	1.04 ± 1.54	<0.16
400, L	0.58 ± 0.29	<0.67	<0.19
Switchyard Spur E			
100, R	0.96 ± 0.30[b]	<0.76	<0.23
200, L	0.66 ± 0.27	1.28 ± 0.90	0.48 ± 0.45
300, R	0.83 ± 0.27	<0.72	<0.18
400, L	0.91 ± 0.28	1.63 ± 1.30	<0.21

[a]Refer to Figure 7.
[b]Errors are 2σ based on counting statistics.

TABLE 5

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS - RAILROAD #2
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
Mainline			
100, L	1.16 ± 0.33[b]	<1.03	1.51 ± 0.45
200, C	0.46 ± 0.26	<0.76	<0.11
300, R	0.93 ± 0.24	1.51 ± 1.99	0.62 ± 0.28
400, L	0.44 ± 0.17	1.62 ± 1.64	0.40 ± 0.33
500, L	0.78 ± 0.22	1.48 ± 1.17	<0.18
600, R	0.54 ± 0.20	2.04 ± 2.05	<0.21
630, C	0.52 ± 0.21	1.19 ± 1.40	<0.16
Railroad #2A			
0, C	0.90 ± 0.26[b]	1.37 ± 1.81	0.32 ± 0.26
100, 2L	0.39 ± 0.16	3.95 ± 1.84	0.76 ± 0.32
200, R	0.36 ± 0.31	<0.93	0.59 ± 0.32
300, C	0.39 ± 0.35	<1.09	1.41 ± 0.52
Railroad #2B			
0, R	0.69 ± 0.21[b]	2.64 ± 0.91	0.50 ± 0.24
100, L	0.26 ± 0.14	<0.61	<0.13
Railroad #2'			
0, L	0.74 ± 0.28	108 ± 7	1.10 ± 0.39
0, R	1.30 ± 0.27	<0.98	2.20 ± 0.48
50, L	1.16 ± 0.26	143 ± 50	1.39 ± 0.47
50, R	0.68 ± 0.30	3.66 ± 2.29	1.14 ± 0.41
100, L	0.70 ± 0.19	<2.11	1.18 ± 0.48
100, R	0.43 ± 0.23	<0.52	<0.11
150, L	0.64 ± 0.28	28.2 ± 2.9	1.12 ± 0.51
150, R	0.90 ± 0.19	8.37 ± 1.53	1.07 ± 0.47
200, L	0.51 ± 0.21	0.98 ± 1.55	1.01 ± 0.66
200, R	1.02 ± 0.28	14.5 ± 3.3	2.02 ± 0.55
207, L	0.83 ± 0.27	8.23 ± 2.70	1.12 ± 0.52
207, R	0.77 ± 0.30	10.7 ± 3.7	1.69 ± 0.52

[a]Refer to Figure 7.
[b]Errors are 2σ based on counting statistics.

TABLE 6

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #1
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	1R	7	7
100	1L	8	8
200	1R	8	8
300	1L	8	8
400	1R	7	7
500	1L	8	8
600	1R	7	7
700	1L	7	7
800	1R	7	7
900	1L	7	6
1000	1R	6	7
1100	1L	7	7
1200	1R	6	7
1300	1L	6	6
1400	1R	7	7
1500	1L	7	7
1600	1R	7	7
1700	1L	7	7
1800	1R	7	7
1900	1L	7	7
2000	1R	7	7
2100	1R	7	7
2200	1L	8	8
2300	1L	7	8
2400	1L	7	7
2500	1R	7	7
2600	1L	6	6
2700	1R	7	7
2800	1L	7	7
2900	1R	7	7
3000	1L	7	7
3100	1R	7	7
3200	1L	6	7
3300	1R	7	7
3400	1L	7	7
3500	1R	6	6
3600	1L	7	8
3700	1R	7	7
3800	1L	7	7
3900	1R	7	7
4000	1L	7	8
4100	1R	7	7

TABLE 6 (Continued)

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #1
WELDON SPRING, MISSOURI

Location (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
4200	1L	7	7
4300	1R	7	7
4400	1L	7	7
4500	1R	7	7
4600	1L	6	6
4700	1R	7	7
4800	1L	6	7
4900	1R	7	7
5000	1L	7	7
5100	1R	7	7
5200	1L	7	7
5300	1R	7	7
5400	1L	6	7
5500	1R	6	7
5600	1L	7	7
5700	1R	7	7
5800	1L	7	7
5900	1R	7	7
6000	1L	7	7
6100	1R	7	7
6200	1L	7	7
6300	1R	7	7
6400	1L	7	7
6500	1R	7	7
6600	1L	7	7
6700	1R	7	7
6800	1L	6	6
6900	1R	7	7
7000	1L	7	7
7100	1R	7	7
7200	1L	7	7
7300	1R	7	7
7400	1L	7	7
7500	1R	7	7
7600	1L	6	7
7700	1R	6	6
7800	1L	7	7
7900	1R	7	7
8000	1L	7	7
8100	1R	7	7
8200	1L	7	7
8300	1R	7	7
8400	1L	7	7

TABLE 6 (Continued)

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #1
WELDON SPRING, MISSOURI

Location (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
8500	1R	7	7
8600	1L	7	7
8700	1R	7	7
8800	1L	7	7
8900	1R	7	7
9000	1L	7	7
9100	1R	7	7
9200	1L	7	7
9300	1R	6	7
9400	1L	6	6
9500	1R	7	7
9600	1L	7	7
9700	1R	7	7
9800	1L	7	7
9900	1R	7	7
10000	1L	7	7
10100	1R	7	7
10200	1L	7	7
10300	1R	7	7
10400	1L	7	7
10500	1R	7	7
10600	1L	7	7
10700	1R	6	6
10800	1L	7	7
10900	1R	7	7
11000	1L	7	7
11100	1R	7	7
11200	1L	7	7
11300	1R	7	7
11400	1L	7	7
11500	1R	7	7
11600	1L	7	7
11700	1R	7	7
11800	1L	7	7
11900	1R	7	7
12000	1L	7	8
12100	1R	7	7
12200	1L	7	7
12300	1R	7	8
12400	1L	8	7
12500	1R	7	7
12600	1L	7	7
12700	1R	7	7

TABLE 6 (Continued)

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #1
WELDON SPRING, MISSOURI

Location (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
12800	1L	7	7
12900	1R	7	8
13000	1L	8	8
13100	1R	7	8
13200	1L	8	8
13300	1R	7	7
13400	1L	7	7
13500	1R	7	7
13600	1L	8	8
13700	1R	7	7
13800	1L	7	8
13900	1R	8	7
14000	1L	7	7
14100	1R	9	8
14200	1L	7	6

[a]Refer to Figure 8.

TABLE 7

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #2
WELDON SPRING, MISSOURI

Location[a] (m)	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	7	7
100	5	6
200	7	7
300	7	7
400	7	7
500	6	7
600	7	8
700	8	8
800	7	8
900	7	7
1000	7	8
1100	7	8
1200	7	7
1300	7	7
1400	6	7
1500	7	7
1600	7	7
1700	7	8
1800	8	8
1900	7	7
2000	7	7
2100	7	7
2200	7	7
2300	7	8
2400	7	7
2500	7	7
2600	7	8
2700	8	9
2800	8	8
2900	7	8
3000	7	8
3100	8	8
3200	7	7

[a]Refer to Figure 8.

TABLE 8

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #3
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	1L	6	6
100	1R	6	7
200	1L	6	7
300	1R	7	6
400	1L	6	7
500	1R	6	6
600	1L	6	6
700	1R	7	6
800	1L	6	6
900	1R	6	6
1000	1L	7	6
1100	1R	7	6
1200	1L	6	6
1300	1R	6	6
1400	1L	6	7
1500	1R	7	7
1600	1L	7	7
1700	1R	7	7
1800	1L	6	7
1900	1R	7	7
2000	1L	6	6
2100	1R	7	7
2200	1L	6	6
2300	1R	6	6
2400	1L	7	7
2500	1R	7	7
2600	1L	7	7
2700	1R	7	7
2800	1L	7	8
2900	1R	8	8
3000	1L	7	7
3100	1R	6	6
3200	1L	7	6
3300	1R	7	6
3400	1L	6	6
3500	1L	7	7
3600	1R	7	7
3700	1L	6	6

[a]Refer to Figure 9.

TABLE 9

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #4
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	1R	7	7
100	.5L	7	7
200	.5R	7	7
300	.5L	7	7
400	.5R	7	7
500	.5L	7	7
600	1R	6	6
700	1L	6	7
717	1R	6	6

[a]Refer to Figure 9.

TABLE 10

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #5
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	1R	7	7
100	1L	6	6
200	1R	6	6
300	1L	7	7
400	1R	7	7
500	1L	7	7
600	1R	7	7
700	1L	7	7
800	1R	7	7
900	1L	7	7
1000	1R	7	7
1100	1L	7	7
1200	1R	6	6
1300	1L	7	6
1400	1R	7	7
1500	1R	7	7
1600	1L	7	7
1700	1R	7	6
1800	1L	7	7
1900	1R	7	7

[a]Refer to Figure 9.

TABLE 27

RADIONUCLIDE CONCENTRATIONS IN H_2O SAMPLES
COLLECTED FROM BOREHOLES
WELDON SPRING, MISSOURI

Borehole[a] No.	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
68	9.10 ± 1.65[b]	17.3 ± 1.6
73	0.60 ± 0.78	2.50 ± 1.09
74	4.85 ± 1.87	9.67 ± 1.76
77	4.75 ± 1.42	5.55 ± 1.25
82	2.05 ± 1.45	11.9 ± 1.5

[a] Refer to Figure 3.
[b] Errors are 2σ based on counting statistics.

TABLE 28

SUMMARY OF SURFACE CONTAMINATION MEASUREMENTS IN BUILDING

BUILDING[a]	SURFACE	TOTAL CONTAMINATION ($dmp/100cm^2$)		TRANSFERABLE CONTAMINTION ($dpm/100cm^2$)		GAMMA EXPOSURE RATE
		ALPHA	BETA-GAMMA	ALPHA	BETA-GAMMA	(μR/h)
1	Walls	<56	<570 - 1720	<1	<3	5 - 6
2	Floors Walls/Equipment	<56	<570 - 1000	<1 - 2	<3	5 - 7
3	Walls	<56	<570 - 930	<1	<3	7 - 8
14	Floors Walls	<56 - 150	<570 - 1360	<1 - 2	<3 - 12	5 - 6
15	Floors	<56	<570 - 720	<1	16 - 23	5 - 7
16	Floors	<56	<570 - 720	<1	14 - 21	5 - 6
17	Floors Walls/Equipment	<56 - 90	<570 - 720	<1	6 - 18	5 - 7
18	Floors Walls	<56	<570 - 2220	<1	<3 - 5	6 - 10
19	Floors	<56	<570 - 1650	<1	6 - 26	6 - 10
20	Equipment	<56	<570	<1	11 - 14	5 - 6
21	Floors Equipment	<56	<570	<1	12 - 22	5 - 6

[a]Refer to Figure 5.

TABLE 29

DIRECT RADIATION MEASUREMENTS AT GRID LINE INTERSECTIONS
LOCATION #1
WELDON SPRING, MISSOURI

Grid[a] Location (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
0N	0W	11	9	13
0N	10W	20	8	8
0N	20W	9	6	6
0N	30W	8	7	7
0N	40W	9	9	9
0N	50W	9	9	35
1N	10W b	33	21	1280
2N	20W b	14	8	11
5N	30W b	9	8	8
6N	40W b	8	7	26
9N	50W b	7	7	18
10N	1E	11	11	98
10N	0W	13	9	55
10N	10W	52	56	1010
10N	20W	42	43	880
10N	30W	15	20	360
10N	40W	9	9	9
10N	50W	7	7	7
10N	90W	8	8	21
10N	130W	6	7	21
20N	0W	9	8	48
20N	10W	22	26	720
20N	20W	38	40	1200
20N	30W	20	12	12
20N	40W	12	9	9
20N	50W	11	9	29
25N	90W b	7	6	12
30N	0W	8	8	22
30N	10W	11	9	34
30N	20W	17	22	510
30N	30W	22	17	77
30N	40W	11	9	26
30N	50W	9	9	10
40N	0W	8	8	15
40N	10W	9	9	16
40N	20W	11	9	45
40N	30W	13	16	320
40N	40W	13	15	220
40N	50W	9	9	33
40N	130W	6	6	18
50N	0W	7	7	27

TABLE 29 (Continued)

DIRECT RADIATION MEASUREMENTS AT GRID LINE INTERSECTIONS
LOCATION #1
WELDON SPRING, MISSOURI

Grid Location (m)	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
50N 10W	9	9	25
50N 20W	9	9	19
50N 30W	9	9	29
50N 40W	11	11	69
50N 50W	9	8	18
50N 90W	7	7	23
50N 130W	7	7	37
50N 150W	6	6	6
50N 160W	7	7	9
57N 170W b	6	6	6
70N 0W	4	4	4
70N 1W b	8	8	9
70N 10W	8	9	44
70N 20W	9	9	33
70N 30W	9	9	14
70N 40W	9	9	16
70N 50W	9	9	40
71N 195W b	7	7	7
90N 0W	4	4	4
90N 6W b	8	9	13
90N 10W	8	8	15
90N 20W	9	9	17
90N 30W	9	9	9
90N 40W	9	9	15
90N 50W	9	8	11
90N 90W	7	7	10
90N 130W	7	7	10
90N 170W	7	8	20
90N 187W b	7	7	14
95N 10W b	8	8	8
102N 170W b	8	8	8
106N 20W b	8	9	23
110N 30W	8	8	8
110N 40W	8	9	20
110N 50W	8	8	21
118N 30W b	9	9	26
130N 40W	8	8	18
130N 50W	8	8	24
130N 90W	7	7	7
130N 130W	7	8	9
130N 140W	7	7	22

TABLE 29 (Continued)

DIRECT RADIATION MEASUREMENTS AT GRID LINE INTERSECTIONS
LOCATION #1
WELDON SPRING, MISSOURI

Grid Location (m)	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
139N 130W b	7	7	20
142N 50W b	8	8	20
170N 90W	7	7	10

[a]Refer to Figure 12.
[b]Measurement taken at fenceline.

TABLE 30

DIRECT RADIATION LEVELS AT LOCATIONS OF ELEVATED SURFACE READINGS
LOCATION #1
WELDON SPRING, MISSOURI

Grid Location[a]		Exposure Rate (μR/h) Contact	1 m Above Surface	Surface Dose Rate (μrad/h)	Contact Exposure[b] Rate After Sample Removal (μR/H)
0N	8E	17	7	610	21
0N	50E	15	8	240	17
2N	8W	82	48	3070	93
2N	14W	410	46	55660	540
4N	9W	150	51	5370	130
6N	5W	200	37	26400	93
8N	14W	>660 c	59	3120	>660 c
8N	18W	160	42	5350	130
9N	17W	190	43	27790	70
11N	4W	82	48	1480	190
11N	11W	130	53	19900	120
12N	14W	93	40	16830	70
13N	7W	120	42	9780	93
13N	19W	420	34	58850	100
18N	2W	44	15	1130	35
18N	17W	170	37	34120	82
19N	52W	39	14	1180	– d
20N	25W	59	42	2300	15
21N	14W	42	30	1810	39
23N	10W	160	15	3480	93
26N	26W	240	37	60460	130
27N	41W	70	20	1790	130

[a]Refer to Figure 13.
[b]Radionuclide concentrations in samples are presented in Table 33.
[c]Observations exceed instrument capability. 1.7 Kg. slag sample collected at this location contained a total U-238 activity of 31 mCi.
[d]No sample collected.

TABLE 31

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED FROM GRID POINT INTERVALS
LOCATION #1
WELDON SPRING, MISSOURI

Grid[a] Location N	W	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
0,	0	0.92 ± 0.24[b]	15.2 ± 2.8	0.31 ± 0.38
0,	10	0.44 ± 0.14	6.07 ± 1.61	0.26 ± 0.33
0,	20	0.42 ± 0.14	1.37 ± 0.69	0.25 ± 0.15
0,	30	0.71 ± 0.27	1.48 ± 1.25	<0.14
0,	40	2.27 ± 0.48	3.16 ± 2.43	2.16 + 0.63
0,	50	1.03 ± 0.28	9.22 ± 3.09	1.12 ± 0.65
1,	10[c]	6.48 ± 0.62	668 ± 7	2.45 ± 0.63
2,	20[c]	0.71 ± 0.26	6.42 ± 1.83	0.13 ± 0.14
5,	30[c]	0.53 ± 0.17	1.25 ± 1.30	<0.10
6,	40[c]	0.60 ± 0.15	0.86 ± 0.59	0.40 ± 0.20
9,	50[c]	0.85 ± 0.20	2.07 ± 0.80	0.70 ± 0.29
10,	0	1.71 ± 0.30	83.4 ± 2.5	0.72 ± 0.27
10,	10	4.93 ± 0.70	1,100 ± 16	1.01 ± 0.73
10,	20	18.1 ± 1.0	694 ± 11	4.82 ± 0.93
10,	30	1.08 ± 0.33	198 ± 4	1.18 ± 0.42
10,	40	1.27 ± 0.40	<1.24	1.52 ± 0.67
10,	50	1.14 ± 0.24	1.79 ± 0.84	0.68 ± 0.42
10,	90	0.85 ± 0.29	0.92 ± 1.48	1.34 ± 0.58
10,	130	0.64 ± 0.20	1.04 ± 1.17	0.82 ± 0.32
20,	0	1.05 ± 0.26	9.18 ± 2.42	0.55 ± 0.33
20,	10	1.74 ± 0.44	4.15 ± 9	1.48 ± 0.61
20,	20	2.68 ± 0.47	763 ± 10	1.64 ± 0.60
20,	30	0.96 ± 0.32	11.8 ± 2.8	0.88 ± 0.55
20,	40	1.21 ± 0.30	7.62 ± 3.35	0.97 ± 0.41
20,	50	1.00 ± 0.34	<1.17	1.27 ± 0.51
25,	90[c]	0.43 ± 0.17	<0.55	0.31 ± 0.33
30,	0	0.81 ± 0.21	6.96 ± 2.35	0.53 ± 0.27
30,	10	1.23 ± 0.28	13.9 ± 1.6	1.36 ± 0.49
30,	20	1.4 ± 0.45	386 ± 13	0.79 ± 0.56
30,	30	1.28 ± 0.30	224 ± 6	0.98 ± 0.46

TABLE 31 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED FROM GRID POINT INTERVALS
LOCATION #1
WELDON SPRING, MISSOURI

Grid Location N, W	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
30, 40	0.97 ± 0.23	0.64 ± 0.66	1.27 ± 0.37
30, 50	1.12 ± 0.28	2.92 ± 2.43	1.25 ± 0.47
40, 0	0.84 ± 0.21	0.60 ± 0.51	0.62 ± 0.42
40, 10	1.00 ± 0.24	4.35 ± 2.00	1.42 ± 0.43
40, 20	1.05 ± 0.34	21.6 ± 3.5	1.12 ± 0.46
40, 30	1.02 ± 0.29	127 ± 5	0.91 ± 0.55
40, 40	0.94 ± 0.45	118 ± 9	0.90 ± 0.90
40, 50	1.23 ± 0.28	2.37 ± 0.96	1.45 ± 0.39
40, 130[c]	0.59 ± 0.23	0.88 ± 1.49	0.48 ± 0.35
50, 0	0.83 ± 0.26	3.71 ± 1.89	0.46 ± 0.44
50, 10	0.86 ± 0.18	4.13 ± 1.12	1.17 ± 0.45
50, 20	1.26 ± 0.25	4.32 ± 0.80	1.14 ± 0.54
50, 30	0.87 ± 0.27	9.54 ± 2.21	0.78 ± 0.65
50, 40	0.90 ± 0.28	44.9 ± 3.7	0.96 ± 0.58
50, 50	1.33 ± 0.32	2.34 ± 2.51	1.21 ± 0.72
50, 90	1.02 ± 0.24	2.26 ± 0.65	1.01 ± 0.34
50, 130	1.09 ± 0.29	3.41 ± 1.12	1.45 ± 0.47
50, 150	0.76 ± 0.22	7.48 ± 2.26	0.30 ± 0.23
50, 160	0.62 ± 0.28	1.44 ± 1.29	0.38 ± 0.24
50, 170	0.85 ± 0.22	0.81 ± 0.66	<0.13
70, 1[c]	0.90 ± 0.22	3.90 ± 1.22	0.71 ± 0.27
70, 10	1.06 ± 0.24	0.97 ± 0.72	1.48 ± 0.35
70, 20	1.28 ± 0.29	3.41 ± 1.98	0.99 ± 0.38
70, 30	0.92 ± 0.27	2.18 ± 1.05	1.28 ± 0.39
70, 40	0.89 ± 0.33	2.47 ± 0.78	0.90 ± 0.40
70, 50	1.15 ± 0.27	7.30 ± 2.30	1.39 ± 0.52
71, 195[c]	0.65 ± 0.22	1.78 ± 1.29	<0.15
90, 6[c]	1.29 ± 0.27	3.49 ± 0.90	1.11 ± 0.34
90, 10	0.83 ± 0.34	2.26 ± 2.96	1.30 ± 0.58
90, 20	1.07 ± 0.28	4.90 ± 1.89	1.23 ± 0.60
90, 30	0.88 ± 0.23	1.45 ± 1.79	1.08 ± 0.38
90, 40	0.84 ± 0.28	3.41 ± 2.77	0.99 ± 0.45
90, 50	1.13 ± 0.22	3.73 ± 0.99	1.45 ± 0.49
90, 90	0.69 ± 0.29	4.15 ± 1.54	0.98 ± 0.65

TABLE 31 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED FROM GRID POINT INTERVALS
LOCATION #1
WELDON SPRING, MISSOURI

Grid Location N	Grid Location W	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
90,	130	1.09 ± 0.33	0.87 ± 0.67	1.68 ± 0.60
90,	170	0.86 ± 0.27	1.56 ± 0.69	1.50 ± 0.56
90,	187[c]	0.90 ± 0.26	2.31 ± 0.96	1.42 ± 0.49
94,	10[c]	1.17 ± 0.29	<1.00	1.35 ± 0.49
102,	70[c]	0.95 ± 0.32	2.97 ± 1.51	1.33 ± 0.46
105,	20	1.07 ± 0.22	5.14 ± 0.94	0.92 ± 0.65
110,	30	1.24 ± 0.36	2.80 ± 1.34	1.11 ± 0.47
110,	40	1.13 ± 0.29	<1.19	1.25 ± 0.50
110,	50	0.43 ± 0.34	6.05 ± 0.28	1.62 ± 0.62
120,	30	1.21 ± 0.52	4.46 ± 2.92	1.04 ± 1.18
130,	40	1.10 ± 0.27	2.70 ± 0.79	1.43 ± 0.55
130,	50	0.89 ± 0.21	1.01 ± 2.83	1.26 ± 0.42
130,	90	1.20 ± 0.41	2.28 ± 2.43	1.24 ± 0.47
130,	130	1.04 ± 0.40	4.25 ± 2.93	1.50 ± 0.65
130,	140	1.05 ± 0.38	1.55 ± 2.92	1.58 ± 1.00
139,	130[c]	1.09 ± 0.27	2.09 ± 0.73	1.03 ± 0.51
142,	50[c]	0.88 ± 0.21	1.80 ± 0.63	1.06 ± 0.55
170,	90	1.02 ± 0.24	2.07 ± 1.47	1.31 ± 0.40
170,	109[c]	1.21 ± 0.22	2.20 ± 1.97	1.57 ± 0.43
176,	90[c]	0.74 ± 0.21	<0.54	0.35 ± 0.22
176,	108[c]	1.19 ± 0.30	2.48 ± 1.20	1.40 ± 0.50

[a] Refer to Figure 12.
[b] Errors are 2σ based on counting statistics.
[c] Samples collected at fenceline.

TABLE 32

RADIONUCLIDE CONCENTRATIONS IN RANDOM SOIL SAMPLES
LOCATION #1
WELDON SPRING, MISSOURI

Grid[a] Location N, W	Depth (cm)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
40, 10	0-15	1.00 ± 0.24[b]	4.35 ± 2.00	1.42 ± 0.43
40, 10	60	1.22 ± 0.24	1.17 ± 2.68	0.84 ± 0.53
40, 10	90	1.08 ± 0.22	1.49 ± 1.04	1.11 ± 0.63
50, 50	0-15	1.33 ± 0.32	2.34 ± 2.51	1.21 ± 0.72
50, 50	60	1.17 ± 0.23	1.96 ± 0.89	1.11 ± 1.89
50, 50	80	0.96 ± 0.23	2.84 ± 2.41	1.81 ± 0.60
50, 90	0-15	1.02 ± 0.24	2.26 ± 0.65	1.01 ± 0.34
50, 90	60	1.22 ± 0.25	1.86 ± 1.61	1.23 ± 0.57
50, 90	90	1.33 ± 0.24	1.45 ± 0.94	1.40 ± 0.50
70, 30	0-15	0.92 ± 0.27	2.17 ± 1.05	1.28 ± 0.39
70, 30	60	0.99 ± 0.24	<0.88	1.11 ± 0.43
70, 30	90	1.18 ± 0.34	1.91 ± 2.35	0.79 ± 0.57
130, 50	0-15	0.89 ± 0.21	1.01 ± 2.83	1.26 ± 0.42
130, 50	60	0.95 ± 0.24	2.54 ± 1.79	1.31 ± 0.41

[a] Refer to Figure 12.
[b] Errors are 2σ based on counting statistics.

TABLE 33

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN - LOCATION #1
WELDON SPRING, MISSOURI

Grid[a] Location N	W	Depth (cm)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
2	8	0 - 6	13.7 ± 0.9[b]	2,010 ± 18	4.29 ± 1.02
2	8	30 - 35	10.7 ± 1.1	818 ± 24	2.78 ± 1.28
2	14	0 - 6	12.5 ± 12.7	29,530 ± 220	<10.2
2	14	15 - 25	40.1 ± 1.3	2,430 ± 10	6.85 ± 1.54
2	14	30 - 35	11.1 ± 0.9	986 ± 14	3.10 ± 0.88
2	14	60 - 75	8.04 ± 0.70	1,360 ± 10	2.36 ± 1.10
2	14	90 - 110	2.38 ± 0.46	332 ± 7	1.93 ± 0.51
4	9	0 - 6	3.03 ± 0.71	3,620 ± 20	2.54 ± 0.91
4	9	20 - 30	15.0 ± 0.9	1,430 ± 10	1.52 ± 0.96
4	9	60 - 75	1.15 ± 0.22	77.1 ± 3.3	1.47 ± 0.38
4	9	90 - 105	0.70 ± 0.20	36.0 ± 1.8	1.09 ± 0.40
6	5	0 - 6	4.91 ± 1.83	15,200 ± 100	<1.34
8	14	0 - 15	<4.83	<133	<5.27
8	18	0 - 6	10.8 ± 1.7	666 ± 11	450 ± 6
9	17	0 - 5	17.0 ± 0.8	<25.0	2.31 ± 1.20
9	17	40 - 50	1.10 ± 0.24	2.76 ± 1.16	1.35 ± 0.39
9	17	95 - 100	7.50 ± 0.90	<17.6	2.65 ± 1.14
11	4	0 - 10	2.62 ± 0.63	1,460 ± 20	1.35 ± 0.76
11	4	10 - 15	<6.98	27,890 ± 20	<7.47
11	4	25 - 30	1.36 ± 0.33	131 ± 7	1.36 ± 0.44
11	4	30 - 60	1.08 ± 0.32	82.3 ± 4.6	1.36 ± 0.53
11	11	0 - 10	3.39 ± 0.77	1,780 ± 20	1.73 ± 0.96
11	11	10 - 15	1.87 ± 0.42	608 ± 13	1.34 ± 0.81
11	11	30 - 35	1.26 ± 0.27	57.0 ± 3.2	1.48 ± 0.43
12	14	0 - 7	7.28 ± 0.87	<17.1	2.58 ± 1.11
12	14	45 - 50	0.77 ± 0.30	179 ± 5	0.88 ± 0.42
12	14	90 - 95	1.31 ± 0.30	7.16 ± 1.36	1.12 ± 0.40
13	7	0 - 6	8.35 ± 1.05	948 ± 24	0.83 ± 0.97
13	7	30 - 50	1.32 ± 0.34	136 ± 5	1.51 ± 0.43
13	7	90 - 110	0.88 ± 0.22	17.0 ± 1.39	1.56 ± 0.49

TABLE 33 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN - LOCATION #1
WELDON SPRING, MISSOURI

Grid Location		Depth (cm)	Radionuclide Concentrations (pCi/g)		
N	W		Ra-226	U-238	Th-232
13	19	0 - 6	11.3 ± 1.6	19,810 ± 50	1.74 ± 1.68
13	19	60 - 75	1.63 ± 0.33	323 ± 6	1.14 ± 0.44
13	19	90 - 110	2.49 ± 0.34	128 ± 7	1.33 ± 0.63
18	2	0 - 15	0.87 ± 0.42	2,110 ± 30	<0.46
18	17	0 - 10	3.27 ± 1.28	10,650 ± 40	2.44 ± 1.40
18	17	60 - 80	1.04 ± 0.34	61.5 ± 6.5	1.23 ± 0.36
18	17	90 - 110	1.27 ± 0.23	27.0 ± 31.8	1.44 ± 0.47
19	52	0 - 15	1.25 ± 0.75	670 ± 26	1.42 ± 0.65
20	25	0 - 15	1.22 ± 0.58	735 ± 24	0.98 ± 1.21
20	25	65 - 70	1.08 ± 0.31	32.1 ± 3.1	1.49 ± 0.53
21	14	0 - 15	2.93 ± 0.53	1,099 ± 11	1.16 ± 0.77
21	14	60 - 75		48.4 ± 4.5	1.79 ± 0.52
23	10	0 - 15	<1.13	14,260 ± 50	<1.26
23	10	30 - 45	0.88 ± 0.17	186 ± 4	1.37 ± 0.35
23	10	60 - 75	1.37 ± 0.29	13.4 ± 3.3	1.17 ± 0.59
26	26	0 - 15	13.7 ± 2.1	15,020 ± 50	<1.41
26	26	50 - 80	1.08 ± 0.27	39.1 ± 3.6	0.94 ± 0.44
27	41	0 - 15	2.66 ± 1.01	792 ± 28	1.34 ± 1.32
27	41	40 - 55	1.30 ± 0.26	130 ± 4	1.23 ± 0.44
N	E				
0,	8	0 - 10	1.24 ± 0.56	551 ± 10	1.01 ± 0.51
0,	8	0 - 15	1.02 ± 0.28	265 ± 5	0.79 ± 0.55
0,	50	0 - 15	1.04 ± 0.43	139 ± 8	1.11 ± 0.49
0,	50	30 - 40	1.28 ± 0.29	7.04 ± 1.34	1.10 ± 0.39

[a] Refer to Figure 13.
[b] Errors are 2σ based on counting statistics.

TABLE 34

RADIONUCLIDE CONCENTRATIONS IN H_2O SAMPLES
COLLECTED FROM DRAINAGE DITCH - LOCATION #1
WELDON SPRING, MISSOURI

Grid Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
18N, 50W	3073 ± 21[b]	4221 ± 18[c]
38N, 90W	0.90 ± 0.56	6.43 ± 1.09

[a] Refer to Figure 12.
[b] Errors are 2σ based on counting statistics.
[c] Isotopic Uranium levels were:

U-238:	1699	± 29
U-235:	66	± 6
U-234:	1643	± 28
Ra-228:	.20	± .64
Ra-226:	<.08	

TABLE 35

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT SAMPLES
COLLECTED FROM DRAINAGE DITCHES - LOCATION #1
WELDON SPRING, MISSOURI

Grid[a] Location N, W	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
18, 43	0.95 ± 0.46[b]	781 ± 13	1.43 ± 0.57
65, 207	0.60 ± 0.15	1.09 ± 0.41	0.48 ± 0.52
70, 170	0.96 ± 0.23	1.74 ± 1.70	11.40 ± 0.62
169, 95	0.97 ± 0.37	2.13 ± 2.22	1.25 ± 0.39
186, 90	1.27 ± 0.27	1.43 ± 1.96	1.32 ± 0.47

[a] Refer to Figure 12.
[b] Errors are 2σ based on counting statistics.

TABLE 36

DIRECT RADIATION LEVELS MEASURED AT GRID LINE INTERSECTIONS
LOCATION #2
WELDON SPRING, MISSOURI

Grid Location[a] S	E	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
0	0	7	7	16
0	10	7	7	32
0	20	7	7	39
0	30	8	8	11
0	40	7	7	7
0	50	8	7	66
0	60	14	13	120
0	70	12	11	120
0	80	8	8	21
10	0	8	8	38
10	10	9	9	43
10	20	8	9	70
10	30	8	7	45
10	40	8	8	40
10	50	9	8	31
10	60	8	7	31
10	70	6	6	15
10	80	7	8	8
20	0	7	8	8
20	10	7	8	31
20	20	7	8	18
20	30	7	8	23
20	40	8	8	8
20	50	7	7	37
20	60	7	7	7

[a]Refer to Figure 14.

TABLE 37

DIRECT RADIATION LEVELS AT LOCATIONS OF ELEVATED SURFACE READINGS
LOCATION #2
WELDON SPRING, MISSOURI

Grid Location[a]		Exposure Rate (μR/h)		Surface Dose Rate (μrad/h)	Contact Exposure[b] Rate After Sample Removal (μR/H)
		Contact	1 m Above Surface		
4S	6E	93	12	93	15
4S	59E	53	21	500	51
5S	68E	150	20	4950	70
6S	11E	26	14	400	35
7S	20E	17	8	130	16

[a]Refer to Figure 15.
[b]Radionuclide concentrations in samples are presented in Table 39.

TABLE 38

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED FROM 10 M GRID INTERVALS - LOCATION #2
WELDON SPRING, MISSOURI

Location[a]		Radionuclide Concentrations (pCi/g)		
S	E	Ra-226	U-238	Th-232
0	0	1.27 ± 0.28[b]	4.81 ± 1.67	1.05 ± 0.42
0	10	0.80 ± 0.22	3.56 ± 2.21	1.08 ± 0.41
0	20	0.91 ± 0.25	7.15 ± 1.28	0.49 ± 0.23
0	30	1.03 ± 0.25	11.7 ± 2.8	1.16 ± 0.55
0	40	1.00 ± 0.36	11.4 ± 3.2	1.13 ± 0.43
0	50	0.64 ± 0.22	3.29 ± 1.99	<0.18
0	60	1.17 ± 0.25	<2.98	1.02 ± 0.48
0	70	1.23 ± 0.41	97.4 ± 7.2	1.33 ± 0.62
0	80	1.05 ± 0.32	8.31 ± 2.12	1.06 ± 0.41
10	0	1.44 ± 0.29	<1.39	1.27 ± 0.40
10	10	1.52 ± 0.37	32.6 ± 3.0	1.91 ± 0.51
10	20	1.84 ± 0.37	57.0 ± 5.1	0.87 ± 0.43
10	30	0.96 ± 0.24	<2.08	0.87 ± 0.34
10	40	1.31 ± 0.34	33.1 ± 4.6	1.22 ± 0.54
10	50	1.77 ± 0.32	30.9 ± 4.2	1.80 ± 0.49
10	60	1.72 ± 0.33	<1.76	1.28 ± 0.44
10	80	0.97 ± 0.26	1.13 ± 2.31	1.13 ± 0.41
10	70	0.92 ± 0.20	1.19 ± 0.20	0.40 ± 0.45
20	0	1.13 ± 0.26	3.92 ± 1.19	1.34 ± 0.52
20	10	0.97 ± 0.32	3.59 ± 3.35	0.99 ± 0.45
20	20	1.14 ± 0.28	4.85 ± 1.28	1.18 ± 0.37
20	30	1.28 ± 0.27	2.81 ± 0.82	1.02 ± 0.34
20	40	0.87 ± 0.27	<1.04	1.23 ± 0.41
20	50	1.14 ± 0.24	<0.97	0.86 ± 0.32
20	60	1.08 ± 0.21	1.09 ± 0.62	1.33 ± 0.52

[a]Refer to Figure 14.
[b]Errors are 2σ based on counting statistics.

TABLE 39

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN
LOCATION #2
WELDON SPRING, MISSOURI

Location[a]	Depth (cm)	Radionuclide Concentrations (pCi/g)		
		Ra-226	U-238	Th-232
4S, 6E	0 - 15	38.8 ± 1.3[b]	34.6 ± 4.7	1.28 ± 0.93
4S, 59E	0 - 10	2.86 ± 0.47	937 ± 13	1.17 ± 0.70
	10 - 15	2.36 ± 0.36	411 ± 35	1.25 ± 0.46
	15 - 30	2.23 ± 0.46	400 ± 10	1.79 ± 1.37
5S, 68E	0 - 10	3.72 ± 1.76	1350 ± 33	<1.23
	15 - 30	5.06 ± 0.62	530 ± 12	2.28 ± 0.83
6S, 11E	0 - 10	2.78 ± 0.44	625 ± 10	1.36 ± 0.48
	15 - 30	1.94 ± 0.42	310 ± 5	1.19 ± 0.49
7S, 20E	0 - 10	1.62 ± 0.38	160 ± 6	1.15 ± 0.46
7S, 20E	10 - 15	0.99 ± 0.29	<1.94	0.88 ± 0.39
12S, 23W	0 - 8	6.16 ± 0.55	390 ± 10	0.47 ± 0.51
	8 - 16	2.78 ± 0.36	74.6 ± 5.0	1.17 ± 0.38
15S, 23W	0 - 8	20.4 ± 0.9	<2.16	1.60 ± 0.73
	8 - 16	36.2 ± 1.3	60.2 ± 5.0	<0.53
	16 - 32	17.4 ± 0.8	10.1 ± 2.2	<0.31
	32 - 46	20.8 ± 0.9	32.4 ± 3.5	0.76 ± 0.57

[a]Refer to Figure 15.
[b]Errors are 2σ based on counting statistics.

TABLE 40

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN - LOCATION #3
WELDON SPRING, MISSOURI

Location[a]	Depth (cm)	Radionuclide Concentrations (pCi/g)		
		Ra-226	U-238	Th-232
455, 2R	0 - 7	3.14 ± 0.68[b]	1683 ± 20	<0.40
455, 2R	7 - 15	1.34 ± 0.58	2640 ± 10	<0.42
455, 2R	15 - 30	0.82 ± 0.40	880 ± 70	<0.23
455, 2R	30 - 45	0.92 ± 0.29	436 ± 15	<0.24
455, 2R	45 - 60	1.28 ± 0.38	477 ± 11	0.58 ± 0.31
Top of loading dock	0 - 6	4.46 ± 0.78	1042 ± 20	<0.46

[a]Refer to Figures 16.
[b]Errors are 2σ based on counting statistics.

TABLE 41

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
S.E. DRAINAGE EASEMENT
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	1L	12	8
0	2L	8	7
10	C	29	120
100	1R	10	14
130	1L	10	44
190	4R	22	43
195	1L	14	25
200	2L	14	15
300	2R	14	16
305	1R	15	29

[a]Refer to Figure 17.

TABLE 42

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL AND SEDIMENT SAMPLES COLLECTED FROM 100 M INTERVALS ALONG THE SOUTHEAST DRAINAGE EASEMENT WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
Soil			
0, L	0.76 ± 0.18[b]	<0.76	0.43 ± 0.18
100, R	5.51 ± 0.45	1.26 ± 3.03	1.66 ± 0.54
200, 2L	2.93 ± 0.38	41.3 ± 4.1	0.87 ± 0.37
300, 2R	8.36 ± 0.54	42.0 ± 2.0	2.69 ± 0.59
Sediment			
0, C	6.57 ± 0.59	39.7 ± 7.0	2.14 ± 0.71
100, C	5.42 ± 0.46	<1.56	2.18 ± 0.48
200, C	4.34 ± 0.53	11.7 ± 3.5	1.41 ± 0.89

[a] Refer to Figure 17.
[b] Errors are 2σ based on counting statistics.

TABLE 43

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES FROM LOCATIONS IDENTIFIED IN THE WALKOVER SCAN - S.E. DRAINAGE EASEMENT WELDON SPRING, MISSOURI

Location[a]	Depth (cm)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
Soil				
OM, 2L	0-15	0.85 ± 0.24[b]	4.20 ± 2.26	0.82 ± 0.44
OM, 2L	15-30	1.02 ± 0.23	2.19 ± 1.37	1.05 ± 0.35
OM, 2L	30-45	0.70 ± 0.19	1.52 ± 0.52	0.98 ± 0.29
OM, 2L	45-60	0.81 ± 0.23	2.10 ± 0.14	0.99 ± 0.10
OM, 2L	60-75	0.71 ± 0.20	4.24 ± 2.30	0.97 ± 0.33
10M, C	0-15	170 ± 2	300 ± 6	13.6 ± 1.91
10M, C	15-30	210 ± 3	1010 ± 17	9.21 ± 2.31
130M, L	0-15	37.5 ± 1.6	231 ± 9	69.1 ± 30.4
130M, L	15-30	68.6 ± 1.6	81.8 ± 5.8	10.9 ± 1.6
130M, L	30-60	32.5 ± 1.4	69.4 ± 5.9	4.95 ± 1.16
190M, 4R	0-15	59.0 ± 1.6	601 ± 11	1.33 ± 0.98
190M, 4R	15-30	31.0 ± 1.1	216 ± 5	1.52 ± 0.90
	30-45			
190M, 4R	45-60	4.07 ± 0.46	181 ± 6	0.88 ± 0.46
195M, L	0-15	20.9 ± 0.9	<3.92	1.28 ± 0.88
195M, L	15-30	12.7 ± 0.8	150 ± 6	0.98 ± 0.75
195M, L	30-45	3.04 ± 0.44	190 ± 6	1.03 ± 0.65
195M, L	45-60	2.04 ± 0.34	<3.77	1.08 ± 0.40
305M, R	0-15	18.1 ± 0.9	5.31 ± 3.52	1.82 ± 1.02
305M, R	15-30	27.2 ± 1.2	66.5 ± 5.2	8.15 ± 1.43
305M, R	45-60	6.87 ± 0.47	25.1 ± 2.2	1.16 ± 0.49

[a] Refer to Figure 17.
[b] Errors are 2σ based on counting statistics.

TABLE 44

RADIONUCLIDE CONCENTRATIONS IN WATER SAMPLES
COLLECTED FROM THE SOUTHEAST DRAINAGE EASEMENT
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
Origin	147 ± 5[b]	44 ± 2[c]
Fenceline	159 ± 5	39 ± 2[d]

[a] Refer to Figure 17.

[b] Errors are 2σ based on counting statistics.

[c] Isotopic Uranium, Radium, and Thorium levels were:

U-238:	129 ± 4
U-235:	4.95 ± 0.78
U-234:	125 ± 4
Ra-228:	2.06 ± 0.53
Ra-226:	0.50 ± 0.09
Th-232:	0.05 ± 0.06
Th-230:	0.13 ± 0.09
Th-228:	0.08 ± 0.07

[d] Isotopic Uranium, Radium, and Thorium levels were:

U-238:	134 ± 4
U-235:	4.76 ± 0.79
U-234:	128 ± 4
Ra-228:	1.94 ± 0.47
Ra-226:	0.59 ± 0.10
Th-232:	0.04 ± 0.05
Th-230:	0.24 ± 0.11
Th-228:	0.05 ± 0.05

TABLE 45

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
LOCATION #5 - DITCH FROM RAFFINATE PIT
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	C	6	6
100	2L	7	8
200	C	13	18
237	C	9	13

[a]Refer to Figure 18.

TABLE 46

DIRECT RADIATION LEVELS AT LOCATIONS OF ELEVATED SURFACE READINGS
LOCATION #5 - DITCH FROM RAFFINATE PIT
WELDON SPRING, MISSOURI

Grid Location[a]		Exposure Rate (μR/h)		Contact Exposure Rate[b] After Sample Removal (μR/h)
		Contact	1 m Above Surface	
22		42	12	–[c]
115	2L	17	8	20
202		45	17	160

[a]Refer to Figure 18.
[b]Radionuclide concentrations of samples are presented in Table 48.
[c]Dash indicates measurement not performed.

TABLE 47

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT SAMPLES
COLLECTED AT 100 M INTERVALS ALONG THE DITCH
FROM THE RAFFINATE PITS (LOCATION #5)
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, C	0.61 ± 0.23[b]	1.25 ± 1.50	0.61 ± 0.47
100, 2L	1.18 ± 0.25	<1.05	1.24 ± 0.35
200, C	8.22 ± 0.60	6.00 ± 1.16	1.21 ± 0.51
237, C	1.81 ± 0.37	<1.10	0.87 ± 0.36

[a] Refer to Figure 18.
[b] Errors are 2σ based on counting statistics.

TABLE 48

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT
COLLECTED FROM THE DITCH FROM THE RAFFINATE PIT (LOCATION #5)
WELDON SPRING, MISSOURI

Location[a]	Depth (cm)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
22M, C	0- 6	27.3 ± 0.9[b]	<1.10	0.62 ± 0.94
115M, 2L	0-15	0.94 ± 0.26	1.66 ± 0.76	0.16 ± 0.45
115M, 2L	15-30	2.96 ± 0.52	<1.34	1.32 ± 0.73
115M, 2L	45-60	7.47 ± 0.53	1.60 ± 1.33	1.20 ± 0.55
115M, 2L	60-75	2.31 ± 0.32	2.06 ± 2.09	1.32 ± 0.44
202M, C	0-15	52.6 ± 1.4	<1.78	1.32 ± 0.69
202M, C	15-30	62.6 ± 1.6	<3.42	<0.70
202M, C	45-60	26.7 ± 1.0	<1.30	1.42 ± 0.70

[a] Refer to Figure 18.
[b] Errors are 2σ based on counting statistics.

TABLE 49

DIRECT RADIATION LEVELS AT LOCATIONS OF ELEVATED SURFACE READINGS
LOCATION #6
WELDON SPRING, MISSOURI

Grid Location[a]		Exposure Rate (μR/h)		Contact Exposure Rate[b] After Sample Removal (μR/h)
		Contact	1 m Above Surface	
95	1L	14	7	17
160	1L	15	8	14

[a]Refer to Figure 19.
[b]Radionuclide concentrations of samples are presented in Table 50.

TABLE 50

RADIONUCLIDE CONCENTRATIONS IN SOIL FROM AREAS IDENTIFIED BY THE WALKOVER SCAN - DITCH #4, LOCATION #6 WELDON SPRING, MISSOURI

Location[a] (m)	Depth (cm)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
95	0-15	1.28 ± 0.29[b]	113 ± 6	1.43 ± 0.74
95	15-30	1.09 ± 0.26	<3.38	1.54 ± 0.45
95	45-60	0.84 ± 0.29	40 ± 5	1.11 ± 0.41
160	0-15	1.60 ± 0.38	123 ± 80	1.56 ± 0.72
160	15-30	1.09 ± 0.28	91 ± 7	0.78 ± 0.53

[a] Refer to Figure 19.
[b] Errors are 2σ based on counting statistics.

TABLE 51

DIRECT RADIATION LEVELS AT LOCATIONS OF ELEVATED SURFACE READINGS
LOCATION #7
WELDON SPRING, MISSOURI

Grid Location[a]		Exposure Rate (μR/h)		Surface Dose Rate (μrad/h)	Contact Exposure[b] Rate After Sample Removal (μR/H)
		Contact	1 m Above Surface		
1154	0.5R	120	14	190	200
1154	1.5R	290	17	500	150

[a]Refer to Figure 11.
[b]Radionuclide concentrations in samples are presented in Table 52.

TABLE 52

RADIONUCLIDE CONCENTRATIONS IN SOIL FROM AREA
IDENTIFIED IN WALKOVER SCAN OF ROAD #1 - LOCATION #7
WELDON SPRING, MISSOURI

Location[a]	Depth (cm)	Radionuclide Concentrations (pCi/g)		
		Ra-226	U-238	Th-232
1154, 0.5R	0 - 5	12.0 $\pm$ 1.0[b]	<1.19	<0.22
1154, 0.5R	10 - 15	206 $\pm$ 3	<4.48	1.41 $\pm$ 1.51
1154, 0.5R	30 - 35	1.73 $\pm$ 0.41	0.53 $\pm$ 1.13	1.24 $\pm$ 1.19
1154, 0.5R	60 - 65	1.02 $\pm$ 0.21	1.21 $\pm$ 1.40	1.29 $\pm$ 0.44
1154, 1.5R	0 - 5	215 $\pm$ 3	<4.69	<1.05
1154, 1.5R	30 - 35	9.0 $\pm$ 1.0	<0.73	0.82 $\pm$ 0.42

[a]Refer to Figure 11.
[b]Errors are 2σ based on counting statistics.

TABLE 53

TH-230 AND U-238 CONCENTRATIONS IN SELECTED SOIL SAMPLES
WELDON SPRING, MISSOURI

Location	Depth	Radionuclide Concentrations (pCi/g) U-238	Th-230
Location #1, 4N, 9W	0- 6 cm	3620 ± 20	19.2 ± 0.5
Location #1, 2N, 8W	0- 6 cm	2010 ± 18	53.4 ± 0.8
Location #1, 0N, 8E	0-10 cm	551 ± 10	2.07 ± 0.17
	10-15 cm	265 ± 5	1.39 ± 0.13
Location #4, 1290M	0-15 cm	123 ± 80	2.52 ± 0.18
Location #4, 1450M	0-15 cm	113 ± 6	3.47 ± 0.21
SEDE 195M, 1L	15-30 cm	150 ± 6	11.5 ± 0.38
195M, 1L	30-45 cm	190 ± 6	4.15 ± 0.21

TABLE 54

AREAS OF ARMY RESERVE PROPERTIES WHICH EXCEEDS RESIDUAL CONTAMINATION CRITERIA[a]

LOCATION	LOCATION DESCRIPTION	RADIONUCLIDES	ESTIMATED QUANTITIES OF MATERIAL EXCEEDING GUIDELINES			REMARKS
			AREA(m^2)	DEPTH(m)	VOLUME(m^3)	
1[b]	Army Reserve Access Area to Bechtel/DOE Property	U-238	1520	1.25	1900	Depth estimated from regression of existing data
2[c]	Army Railroad #2	U-238	400	.5	200	
3[d]	Army Railroad #2 Loading Dock	U-238	2	1.0	2	Isolated "hot" spots
4[e]	Southeast Drainage Easement	U-238, Th-232, Ra-226	2500	1.0	2500	Estimated width of contamination is 5m
5[f]	Drainage Ditch From Raffinate Pit Area	Ra-226	750	1.0	750	Estimated width of contamination is 3m
6[g]	Drainage Ditch #4 (near property fenceline)	U-238	600	1.0	600	Estimated width of contamination is 3m
7[h]	Army Reserve Road #1	Ra-226	<.5	<.5	<.5	Isolated "hot" spot

[a]Refer to Appendix C.
[b]Refer to Figure 20.
[c]Refer to Figure 21.
[d]Refer to Figure 22.
[e]Refer to Figure 23.
[f]Refer to Figure 24.
[g]Refer to Figure 25.
[h]Refer to Figure 11.

REFERENCES

1. Title 40, Code of Federal Regulations, Part 141, Interim Primary Drinking Water Standards, Federal Register, July 1976.

APPENDIX A

MAJOR SAMPLING AND ANALYTICAL EQUIPMENT

TABLE 11

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #6
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	R	5	5
100	L	6	6
200	R	7	6
300	L	6	6
400	R	6	6
500	L	6	5
600	R	6	6
700	L	6	6
800	R	6	6
900	L	6	6
1000	R	6	5
1100	L	6	5
1200	R	6	6
1300	L	6	6
1400	R	6	5
1500	L	6	6
1600	R	6	5
1700	L	6	6
1800	R	6	5
1900	L	6	5
2000	R	6	5
2100	L	6	5
2200	R	6	6
2300	L	5	5
2400	R	5	5
2500	L	6	6
2600	R	6	5

[a]Refer to Figure 10.

TABLE 12

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
ROAD #7
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	1R	7	7
100	1L	8	8
200	1R	7	8
300	1L	7	7
400	1R	8	7
500	1L	7	8
600	1R	8	8
700	1L	7	7

[a]Refer to Figure 10.

TABLE 13

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #1
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, R	1.32 ± 2.19[b]	6.12 ± 1.50	1.31 ± 0.79
100, L	0.75 ± 0.29	1.40 ± 0.72	0.84 ± 0.29
200, R	0.87 ± 0.22	5.50 ± 2.04	0.99 ± 0.48
300, L	1.37 ± 0.33	6.19 ± 2.39	0.94 ± 0.37
400, R	0.84 ± 0.22	0.31 ± 0.56	0.62 ± 0.26
500, L	0.85 ± 0.31	1.81 ± 1.79	0.45 ± 0.29
600, R	0.51 ± 0.21	<0.73	0.46 ± 0.37
700, L	0.62 ± 0.17	1.17 ± 0.53	0.43 ± 0.21
800, R	0.75 ± 0.22	<0.62	0.38 ± 0.54
900, L	0.65 ± 0.20	<0.77	0.41 ± 0.32
1000, R	0.34 ± 0.17	0.79 ± 0.68	<0.10
1100, L	1.20 ± 0.29	2.77 ± 1.29	1.47 ± 0.56
1200, R	1.26 ± 0.29	3.00 ± 2.19	1.50 ± 0.45
1300, L	0.69 ± 0.53	1.04 ± 0.71	0.25 ± 0.18
1400, R	0.69 ± 0.22	1.94 ± 1.54	0.60 ± 0.42
1500, L	0.75 ± 0.38	1.40 ± 0.94	0.40 ± 0.29
1600, R	0.78 ± 0.24	1.56 ± 0.82	0.53 ± 0.54
1700, L	0.40 ± 0.13	2.47 ± 1.19	<0.09
1800, R	0.67 ± 0.19	1.10 ± 1.02	0.47 ± 0.24
1900, L	0.64 ± 0.21	0.82 ± 0.69	0.37 ± 0.17
2000, R	0.84 ± 0.34	<0.66	0.45 ± 0.27
2100, R	0.85 ± 0.26	2.55 ± 1.53	<0.30
2200, L	0.60 ± 0.21	1.06 ± 0.88	0.61 ± 0.23
2300, R	0.89 ± 0.24	<0.88	1.23 ± 0.52
2400, L	0.46 ± 0.15	<0.52	0.50 ± 0.24
2500, R	0.73 ± 0.16	2.26 ± 0.57	0.47 ± 0.22
2600, L	0.67 ± 0.18	<0.57	0.33 ± 0.30
2700, R	0.91 ± 0.26	1.29 ± 1.20	0.80 ± 0.31
2800, L	0.50 ± 0.16	1.19 ± 0.79	0.37 ± 0.25
2800, L	0.53 ± 0.16	1.03 ± 0.58	0.19 ± 0.15
2900, R	0.79 ± 0.27	<0.59	0.80 ± 0.32
3000, L	0.82 ± 0.26	2.46 ± 1.68	1.06 ± 0.36
3100, R	<0.18	<0.69	0.44 ± 0.38
3200, L	0.53 ± 0.16	1.25 ± 0.56	0.73 ± 0.13
3300, R	0.61 ± 0.17	0.41 ± 0.42	0.60 ± 0.30
3400, L	0.85 ± 0.22	<0.70	0.46 ± 0.23
3500, R	0.73 ± 0.17	1.54 ± 1.22	0.48 ± 0.32
3600, L	0.99 ± 0.23	1.50 ± 0.67	0.64 ± 0.40
3700, R	0.93 ± 0.24	<0.86	0.71 ± 0.27
3800, L	0.88 ± 0.37	1.35 ± 1.01	0.78 ± 0.47
3900, R	0.84 ± 0.28	1.10 ± 1.69	0.51 ± 0.48
4000, L	0.91 ± 0.21	1.65 ± 0.53	1.25 ± 0.36

TABLE 13 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #1
WELDON SPRING, MISSOURI

Location	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
4100, R	0.70 ± 0.16	0.52 ± 1.41	0.51 ± 0.25
4200, L	0.70 ± 0.19	1.01 ± 1.10	0.52 ± 0.30
4300, R	0.91 ± 0.20	1.25 ± 1.28	0.42 ± 0.58
4400, L	0.76 ± 0.22	1.05 ± 0.93	1.11 ± 0.40
4500, R	0.76 ± 0.18	1.67 ± 1.26	0.45 ± 0.23
4600, L	0.59 ± 0.21	0.91 ± 1.25	<0.15
4700, R	0.73 ± 0.21	<0.70	0.58 ± 0.40
4800, L	0.75 ± 0.16	1.05 ± 0.82	0.36 ± 0.22
4900, R	0.56 ± 0.24	<0.66	0.32 ± 0.45
5000, L	0.64 ± 0.22	<0.64	0.45 ± 0.25
5100, R	0.46 ± 0.16	0.50 ± 0.85	0.36 ± 0.21
5200, L	0.63 ± 0.19	<0.70	<0.14
5300, R	0.72 ± 0.18	0.95 ± 1.16	<0.11
5400, L	0.67 ± 0.16	0.65 ± 0.77	0.27 ± 0.18
5500, R	0.93 ± 0.28	<0.73	0.66 ± 0.33
5600, L	0.61 ± 0.15	1.72 ± 0.55	0.45 ± 0.22
5700, R	0.63 ± 0.18	0.84 ± 0.60	0.42 ± 0.30
5800, L	0.74 ± 0.21	<0.80	<0.16
5900, R	0.88 ± 0.23	<0.72	0.60 ± 0.35
6000, L	0.58 ± 0.21	1.01 ± 1.10	0.41 ± 0.28
6100, R	0.80 ± 0.27	1.82 ± 1.67	0.65 ± 0.37
6200, L	0.93 ± 0.20	<0.79	<0.19
6300, R	0.67 ± 0.18	1.57 ± 0.61	0.40 ± 0.55
6400, L	0.46 ± 0.14	<0.48	<0.09
6500, R	0.47 ± 0.15	<0.54	0.27 ± 0.20
6600, L	0.91 ± 0.21	0.88 ± 0.52	0.06 ± 0.07
6700, R	0.54 ± 0.16	<0.37	<0.10
6800, L	0.66 ± 0.17	<0.45	<0.10
6900, R	0.61 ± 0.15	0.75 ± 0.62	0.25 ± 0.15
7000, L	0.67 ± 0.18	0.99 ± 0.71	0.16 ± 0.15
7100, R	0.72 ± 0.17	0.62 ± 0.64	0.23 ± 0.15
7200, L	0.48 ± 0.15	0.52 ± 0.84	0.31 ± 0.14
7300, R	0.47 ± 0.23	<0.54	0.25 ± 0.22
7400, L	0.67 ± 0.13	0.65 ± 0.49	0.34 ± 0.17
7500, R	0.69 ± 0.18	0.69 ± 1.66	0.16 ± 0.12
7600, L	0.49 ± 0.12	1.17 ± 0.34	<0.09
7700, R	0.43 ± 0.17	0.93 ± 1.08	<0.12
7800, L	0.64 ± 0.20	0.61 ± 1.81	0.59 ± 0.22
7900, R	0.83 ± 0.26	<0.64	0.21 ± 0.24
8000, L	0.99 ± 0.31	<0.72	<0.21
8100, R	0.87 ± 0.23	<0.72	<0.18
8200, L	0.64 ± 0.19	0.47 ± 0.70	0.35 ± 0.25

TABLE 13 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #1
WELDON SPRING, MISSOURI

Location	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
8300, R	0.65 ± 0.17	2.14 ± 0.96	<0.13
8400, L	0.60 ± 0.13	1.02 ± 0.55	0.30 ± 0.19
8500, R	0.77 ± 0.20	<0.68	0.42 ± 0.23
8600, L	0.64 ± 0.15	0.64 ± 0.77	0.18 ± 0.11
8700, R	0.68 ± 0.16	<0.51	0.30 ± 0.17
8800, L	0.66 ± 0.17	0.94 ± 1.00	0.25 ± 0.20
8900, R	0.69 ± 0.20	0.87 ± 0.68	0.56 ± 0.30
9000, L	0.62 ± 0.21	<0.43	0.56 ± 0.24
9100, R	0.78 ± 0.28	<0.70	0.39 ± 0.18
9200, L	0.63 ± 0.17	0.59 ± 0.74	0.44 ± 0.26
9300, R	0.67 ± 0.18	<0.50	<0.12
9400, L	0.44 ± 0.20	<0.39	0.29 ± 0.22
9500, R	0.69 ± 0.15	1.86 ± 0.83	0.45 ± 0.21
9600, L	0.67 ± 0.17	0.70 ± 0.32	0.24 ± 0.23
9700, R	0.76 ± 0.17	1.35 ± 0.66	0.36 ± 0.23
9800, L	1.00 ± 0.18	1.65 ± 0.67	0.37 ± 0.35
9900, R	0.78 ± 0.23	1.29 ± 1.35	0.59 ± 0.27
10000, L	0.55 ± 0.13	<0.48	0.18 ± 0.24
10100, R	0.44 ± 0.21	1.02 ± 1.29	0.24 ± 0.29
10200, L	0.84 ± 0.25	1.20 ± 0.48	0.29 ± 0.22
10300, R	0.60 ± 0.23	0.84 ± 1.72	0.55 ± 0.27
10400, L	0.85 ± 0.23	<0.71	1.12 ± 0.32
10500, R	0.82 ± 0.23	1.48 ± 0.58	0.29 ± 0.21
10600, L	0.77 ± 0.29	1.56 ± 1.92	1.09 ± 0.39
10700, R	0.81 ± 0.29	<0.72	0.20 ± 0.39
10800, L	0.85 ± 0.25	0.76 ± 0.84	0.60 ± 0.29
10900, R	0.83 ± 0.22	<0.71	0.72 ± 0.36
11000, L	0.62 ± 0.15	<0.51	0.31 ± 0.17
11100, R	0.66 ± 0.14	1.23 ± 0.49	0.13 ± 0.08
11200, L	0.59 ± 0.20	1.01 ± 1.33	0.37 ± 0.31
11300, R	1.15 ± 0.23	1.21 ± 1.57	0.55 ± 0.37
11400, L	0.81 ± 0.25	1.39 ± 0.75	0.45 ± 0.33
11500, R	0.60 ± 0.17	0.78 ± 0.90	0.51 ± 0.23
11600, L	0.92 ± 0.21	0.91 ± 1.06	0.33 ± 0.28
11700, R	0.82 ± 0.19	1.84 ± 0.68	0.42 ± 0.20
11800, L	0.68 ± 0.24	<0.51	0.29 ± 0.20
11900, R	0.99 ± 0.26	1.60 ± 0.96	0.83 ± 0.42
12000, L	0.84 ± 0.22	0.64 ± 0.62	0.83 ± 0.44
12100, R	0.54 ± 0.17	0.78 ± 1.07	0.23 ± 0.13
12200, L	0.53 ± 0.25	<0.78	0.43 ± 0.37
12300, R	0.90 ± 0.23	0.74 ± 1.08	0.39 ± 0.24
12400, L	0.56 ± 0.16	1.24 ± 0.94	0.51 ± 0.21

TABLE 13 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #1
WELDON SPRING, MISSOURI

Location	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
12500 R	0.50 ± 0.23	1.25 ± 2.74	<0.16
12600, L	0.86 ± 0.20	1.31 ± 0.75	0.43 ± 0.21
12700, R	0.91 ± 0.30	5.52 ± 2.78	1.19 ± 0.52
12800, L	0.57 ± 0.20	2.21 ± 0.87	0.55 ± 0.26
12900, R	0.73 ± 0.30	1.81 ± 2.06	0.98 ± 0.48
13000, L	0.74 ± 0.17	1.73 ± 1.45	0.87 ± 0.44
13100, R	0.47 ± 0.12	0.95 ± 1.18	0.34 ± 0.24
13200, L	0.92 ± 0.25	1.41 ± 1.04	0.90 ± 0.41
13300, R	0.53 ± 0.22	1.08 ± 1.10	0.34 ± 0.24
13400, L	0.80 ± 0.20	0.84 ± 2.19	0.83 ± 0.31
13500, R	0.71 ± 0.23	1.69 ± 0.86	0.49 ± 0.44
13600, L	1.05 ± 0.27	2.05 ± 1.66	1.17 ± 0.40
13700, R	0.62 ± 0.15	1.64 ± 0.99	0.27 ± 0.26
13800, L	1.16 ± 0.26	3.07 ± 1.65	1.14 ± 0.49
13900, R	0.29 ± 0.05	0.43 ± 0.12	0.14 ± 0.05
14000, L	1.21 ± 0.23	2.06 ± 1.64	1.11 ± 0.56
14100, R	0.97 ± 0.19	3.13 ± 0.51	0.35 ± 0.24
14200, L	0.62 ± 0.27	1.22 ± 1.49	0.44 ± 0.39

[a]Refer to Figure 8.
[b]Errors are 2σ based on counting statistics.

TABLE 14

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #2
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, L	1.07 ± 0.28[b]	2.08 ± 1.88	0.87 ± 0.42
100, R	0.38 ± 0.13	0.26 ± 0.32	0.36 ± 0.20
200, L	0.67 ± 0.27	1.38 ± 1.90	0.56 ± 0.43
300, R	0.76 ± 0.19	<0.73	0.58 ± 0.32
400, L	1.03 ± 0.21	<0.69	0.49 ± 0.28
500, R	0.81 ± 0.26	1.19 ± 1.01	0.72 ± 0.32
600, L	0.91 ± 0.31	1.57 ± 1.38	0.36 ± 0.50
700, R	0.96 ± 0.25	<0.82	0.56 ± 0.35
800, L	0.68 ± 0.19	0.88 ± 0.50	0.55 ± 0.43
900, R	0.84 ± 0.22	1.48 ± 0.92	0.85 ± 0.40
1000, L	0.65 ± 0.23	<0.85	0.46 ± 0.26
1100, R	1.21 ± 0.68	0.62 ± 1.01	0.60 ± 0.23
1200, L	0.57 ± 0.21	1.46 ± 1.78	1.27 ± 0.52
1300, R	0.87 ± 0.20	3.47 ± 2.66	0.75 ± 0.33
1400, L	0.64 ± 0.15	0.75 ± 0.75	<0.09
1500, R	0.76 ± 0.23	<0.55	<0.11
1600, L	0.90 ± 0.25	<0.92	0.33 ± 0.28
1700, R	0.87 ± 0.28	0.60 ± 0.59	1.10 ± 0.39
1800, L	1.02 ± 0.26	1.83 ± 1.07	0.99 ± 0.59
1900, L	0.72 ± 0.20	<1.34	0.55 ± 0.30
2000, L	0.39 ± 0.10	0.51 ± 0.28	0.21 ± 0.15
2100, R	0.58 ± 0.19	5.81 ± 1.34	0.39 ± 0.27
2200, L	0.76 ± 0.22	<0.54	<0.14
2300, R	0.65 ± 0.26	2.50 ± 1.58	0.56 ± 0.34
2400, L	0.85 ± 0.29	1.38 ± 1.01	1.04 ± 0.41
2500, R	0.61 ± 0.30	<0.62	0.78 ± 0.38
2600, L	1.10 ± 0.34	1.34 ± 1.91	1.26 ± 0.63
2700, R	1.18 ± 0.26	1.12 ± 0.61	1.30 ± 0.44
2800, L	0.87 ± 0.31	0.97 ± 2.03	1.19 ± 0.69
2900, R	1.16 ± 0.24	4.13 ± 2.21	1.05 ± 0.53
3000, L	0.72 ± 0.23	1.31 ± 0.87	1.08 ± 0.46
3100, R	1.26 ± 0.42	1.66 ± 1.12	1.40 ± 0.65
3200, L	1.13 ± 0.29	1.00 ± 2.59	1.06 ± 0.33

[a]Refer to Figure 8.
[b]Errors are 2σ based on counting statistics.

TABLE 15

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES COLLECTED AT 100 M INTERVALS ALONG ROAD #3 WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, L	0.66 ± 0.17[b]	1.25 ± 0.48	0.12 ± 0.11
100, R	0.82 ± 0.25	2.01 ± 1.20	0.25 ± 0.47
200, L	0.83 ± 0.20	1.35 ± 1.30	0.34 ± 0.50
300, R	0.80 ± 0.25	1.50 ± 0.91	0.71 ± 0.51
400, L	1.23 ± 0.48	<1.09	1.01 ± 0.45
500, R	0.72 ± 0.20	0.89 ± 1.01	0.18 ± 0.21
600, L	0.81 ± 0.22	0.87 ± 1.27	0.22 ± 0.23
700, R	0.55 ± 0.15	0.67 ± 1.02	<0.09
800, L	0.69 ± 0.25	<0.57	0.43 ± 0.43
900, R	0.47 ± 0.17	2.13 ± 1.15	0.29 ± 0.25
1000, L	0.68 ± 0.20	<0.59	<0.16
1100, R	0.51 ± 0.16	<0.49	0.32 ± 0.25
1200, L	0.43 ± 0.13	<0.42	<0.11
1300, R	0.70 ± 0.21	1.15 ± 1.14	0.50 ± 0.29
1400, L	0.78 ± 0.28	<0.79	0.74 ± 0.37
1500, R	0.74 ± 0.21	2.85 ± 1.59	0.33 ± 0.19
1600, L	0.61 ± 0.18	1.96 ± 1.01	0.44 ± 0.37
1700, R	0.98 ± 0.22	<0.61	0.66 ± 0.34
1800, L	1.03 ± 0.29	<0.76	1.10 ± 0.37
1900, R	0.73 ± 0.18	<0.60	0.59 ± 0.28
2000, L	1.00 ± 0.33	1.11 ± 1.64	1.28 ± 0.39
2100, L	0.72 ± 0.23	0.98 ± 1.30	0.67 ± 0.42
2200, L	0.98 ± 0.29	1.28 ± 1.51	0.56 ± 0.53
2300, R	1.12 ± 0.24	<0.69	0.32 ± 0.18
2400, L	0.97 ± 0.25	<0.67	0.63 ± 0.26
2500, R	0.76 ± 0.24	0.94 ± 1.51	0.72 ± 0.29
2600, L	0.80 ± 0.22	<0.52	0.24 ± 0.18
2700, R	1.02 ± 0.22	1.87 ± 1.50	0.67 ± 0.39
2800, L	1.19 ± 0.21	1.96 ± 1.49	1.45 ± 0:57
2900, R	1.05 ± 0.21	<0.69	1.16 ± 0.53
3000, L	0.54 ± 0.19	1.41 ± 0.80	1.41 ± 0.80
3100, R	0.61 ± 0.24	<0.70	0.36 ± 0.29
3200, L	0.76 ± 0.24	<0.55	0.48 ± 0.27
3300, R	0.78 ± 0.24	0.59 ± 1.45	0.37 ± 0.32
3400, L	0.74 ± 0.29	<0.62	0.40 ± 0.23
3500, L	1.11 ± 0.32	1.24 ± 1.55	0.79 ± 0.57
3600, R	0.98 ± 0.27	0.93 ± 1.42	1.06 ± 0.45
3700, L	0.86 ± 0.19	<0.63	0.38 ± 0.33

[a]Refer to Figure 9.
[b]Errors are 2σ based on counting statistics.

TABLE 16

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #4
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, L	1.01 ± 0.23[b]	1.24 ± 1.42	0.77 ± 0.42
100, 0.5L	0.73 ± 0.16	<0.50	<0.13
200, 0.5R	0.93 ± 0.22	1.97 ± 1.45	0.80 ± 0.38
300, 0.5L	0.64 ± 0.28	<0.65	0.37 ± 0.33
400, 0.5R	0.64 ± 0.15	<0.49	0.30 ± 0.25
500, 0.5L	0.74 ± 0.21	0.75 ± 1.27	0.29 ± 0.31
600, R	0.90 ± 0.21	<0.50	0.32 ± 0.19
700, L	0.80 ± 0.21	0.89 ± 1.13	<0.13
717, R	0.98 ± 0.21	1.22 ± 0.56	0.69 ± 0.37

[a]Refer to Figure 9.
[b]Errors are 2σ based on counting statistics.

TABLE 17

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #5
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, 0.5R	0.54 ± 0.14[b]	1.45 ± 1.20	<0.17
100, 0.5L	0.39 ± 0.13	<0.63	0.39 ± 0.21
200, 0.5R	0.80 ± 0.29	1.29 ± 1.57	0.41 ± 0.25
300, 0.5L	0.76 ± 0.19	1.16 ± 1.04	0.38 ± 0.38
400, R	0.73 ± 0.17	<0.66	0.34 ± 0.28
500, L	0.54 ± 0.13	0.54 ± 0.67	0.54 ± 0.39
600, R	0.57 ± 0.17	<0.59	0.34 ± 0.33
700, L	0.61 ± 0.17	<0.61	0.44 ± 0.17
800, R	0.62 ± 0.18	<0.55	0.37 ± 0.25
900, L	0.67 ± 0.21	0.63 ± 0.96	0.32 ± 0.24
1100, L	0.67 ± 0.31	<0.84	0.48 ± 0.42
1200, R	0.61 ± 0.15	0.30 ± 0.28	<0.10
1300, L	0.85 ± 0.33	1.54 ± 2.06	0.62 ± 0.34
1400, R	0.88 ± 0.23	1.12 ± 1.16	0.26 ± 0.26
1500, R	0.74 ± 0.15	0.74 ± 0.76	1.12 ± 0.35
1600, L	0.85 ± 0.20	1.15 ± 1.35	0.24 ± 0.32
1700, R	0.65 ± 0.16	<0.56	<0.11
1800, L	0.71 ± 0.16	0.63 ± 0.51	0.33 ± 0.20
1900, R	0.61 ± 0.19	0.70 ± 1.55	<0.13

[a]Refer to Figure 8.
[b]Errors are 2σ based on counting statistics.

TABLE 18

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #6
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, R	0.40 ± 0.16[b]	1.08 ± 0.42	0.79 ± 0.26
100, L	0.69 ± 0.21	1.56 ± 1.60	0.99 ± 0.44
200, R	0.85 ± 0.24	0.64 ± 2.80	1.36 ± 0.42
300, L	0.93 ± 0.18	0.89 ± 0.60	1.15 ± 0.37
400, R	0.44 ± 0.12	0.53 ± 0.67	0.42 ± 0.27
500, L	0.56 ± 0.18	<0.54	0.45 ± 0.20
600, R	0.74 ± 0.27	1.06 ± 1.25	1.35 ± 0.41
700, L	0.36 ± 0.16	0.73 ± 0.39	0.52 ± 0.20
800, R	0.73 ± 0.19	1.02 ± 1.03	0.31 ± 0.23
900, L	0.74 ± 0.18	1.50 ± 1.94	<0.12
1000, R	0.57 ± 0.22	1.16 ± 1.60	0.63 ± 0.24
1100, R	0.63 ± 0.16	2.16 ± 0.52	0.27 ± 0.24
1200, R	1.16 ± 0.28	3.05 ± 1.83	1.54 ± 0.47
1300, L	0.47 ± 0.14	1.44 ± 0.96	0.21 ± 0.25
1400, R	1.07 ± 0.27	<0.87	0.47 ± 0.29
1500, L	0.72 ± 0.24	1.66 ± 0.90	1.27 ± 0.36
1600, R	0.86 ± 0.25	1.23 ± 1.32	0.32 ± 0.27
1700, L	0.84 ± 0.30	2.20 ± 1.87	1.09 ± 0.58
1800, R	0.77 ± 0.16	<0.55	0.41 ± 0.29
1900, L	0.82 ± 0.20	0.84 ± 1.18	0.29 ± 0.51
2000, R	0.77 ± 0.18	<0.74	0.54 ± 0.24
2100, L	1.06 ± 0.21	1.32 ± 1.03	0.97 ± 0.34
2200, R	0.59 ± 0.23	1.62 ± 3.07	<0.18
2300, L	0.48 ± 0.16	1.15 ± 1.59	0.17 ± 0.10
2400, R	0.63 ± 0.15	0.31 ± 0.31	0.18 ± 0.20
2500, L	0.69 ± 0.22	<0.80	0.59 ± 0.26
2600, R	0.87 ± 0.20	<0.67	0.46 ± 0.38

[a]Refer to Figure 9.
[b]Errors are 2σ based on counting statistics.

TABLE 19

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
COLLECTED AT 100 M INTERVALS ALONG ROAD #7
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
0, R	1.00 ± 0.26[b]	1.67 ± 0.69	0.55 ± 0.29
100, L	1.06 ± 0.28	2.56 ± 2.13	0.62 ± 0.44
200, R	0.76 ± 0.16	<0.54	0.53 ± 0.23
300, L	0.75 ± 0.17	0.24 ± 0.40	0.61 ± 0.28
400, R	0.95 ± 0.24	<0.85	0.85 ± 0.35
500, L	0.84 ± 0.24	0.95 ± 0.41	1.92 ± 0.97
600, R	0.79 ± 0.32	1.35 ± 3.73	0.95 ± 0.72
700, L	0.67 ± 0.25	0.48 ± 1.77	0.57 ± 0.36

[a]Refer to Figure 10.
[b]Errors are 2σ based on counting statistics.

TABLE 20

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
DITCH #4
WELDON SPRING, MISSOURI

Location[a] (m)	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
Ditch #4		
0	8	14
100	10	10
200	10	8
300	10	10
400	7	7
500	7	7
600	7	7
700	7	7
800	7	7
900	6	7
1000	6	6
1100	6	6
1200	6	6
1300	6	7
1400	6	6
1500	6	6
Ditch #4A		
0	6	6
100	7	7
200	6	6
300	7	7
400	6	7
500	6	6
600	7	7
700	6	7
800	7	7
877	6	6
Ditch Originating at		
Loc. #1 0	8	8
100	7	8
200	7	7
300	6	6
400	6	6
500	7	6
600	7	7

[a]Refer to Figure 4.

TABLE 21

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT
COLLECTED AT 100 M INTERVALS - DITCH #4, #4A AND THE DITCH FROM LOCATION #1
WELDON SPRING, MISSOURI

Location[a] (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
Ditch #4			
0, C	1.02 ± 0.32[b]	59.2 ± 3.6	1.71 ± 0.45
100, C	1.22 ± 0.25	0.52 ± 5.67	1.05 ± 0.55
200, C			
300, C	1.39 ± 0.23	12.1 ± 3.6	1.80 ± 0.72
400, C	1.07 ± 0.22	1.91 ± 2.24	1.33 ± 0.66
500, C			
600, C	1.06 ± 0.26	<1.42	1.13 ± 0.60
700, C	1.57 ± 0.24	2.24 ± 1.24	0.90 ± 0.28
800, C	1.23 ± 0.27	2.43 ± 1.89	1.16 ± 0.49
900, R	0.92 ± 0.23	7.24 ± 3.11	0.86 ± 0.54
1000, L			
1100, R	0.70 ± 0.20	<0.73	0.62 ± 0.34
1200, C	0.91 ± 0.30	0.75 ± 2.58	0.90 ± 0.48
1300, C			
1400, C	0.79 ± 0.21	2.84 ± 1.61	1.10 ± 0.52
1500, R	0.93 ± 0.31	<1.03	2.23 ± 0.61
Ditch #4A			
0, R	1.07 ± 0.22	2.08 ± 1.43	1.15 ± 0.39
100, L	0.86 ± 0.29	1.20 ± 0.56	1.13 ± 0.31
200, R	0.53 ± 0.26	<0.88	1.42 ± 0.37
300, L	0.72 ± 0.25	<1.11	1.18 ± 0.38
400, R	1.36 ± 0.31	2.75 ± 2.02	1.66 ± 1.04
500, L	0.75 ± 0.28	1.41 ± 1.29	1.28 ± 0.41
600, R	0.84 ± 0.22	0.46 ± 0.57	1.53 ± 0.44
700, L	1.03 ± 0.33	3.95 ± 2.41	1.44 ± 0.53
800, R	1.06 ± 0.32	<1.07	0.83 ± 0.39
877, L	0.71 ± 0.20	0.95 ± 0.85	1.22 ± 0.37
Location #1			
0M, C	0.90 ± 0.25[b]	2.19 ± 0.68	1.57 ± 0.38
100M, C	0.90 ± 0.21	7.65 ± 2.07	1.22 ± 0.43
200M, C	0.93 ± 0.34	7.56 ± 2.39	1.52 ± 0.46
300M, C	0.84 ± 0.27	2.77 ± 2.18	1.60 ± 0.50
400M, C	0.63 ± 0.15	1.66 ± 1.00	0.84 ± 0.26
500M, C	0.80 ± 0.20	2.69 ± 0.94	0.97 ± 0.30
600M, C	0.89 ± 0.21	6.58 ± 2.64	1.32 ± 0.61

[a] Refer to Figure 4.
[b] Errors are 2σ based on counting statistics.

TABLE 22

RADIONUCLIDE CONCENTRATIONS IN SURFACE WATER SAMPLES
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
Pond Off Railroad #2 (North Bank)	1.93 ± 0.47[b]	8.09 ± 0.78
Pond Off Road #6 (West Bank)	0.74 ± 0.57	2.09 ± 1.00
Raffinate Ditch, 22M	4.28 ± 2.24	3.22 ± 2.57
Ditch 4A - Origin	1.38 ± 0.74	4.98 ± 1.00

[a] Refer to Figure 4.
[b] Errors are 2σ based on counting statistics.

TABLE 23

DIRECT RADIATION LEVELS MEASURED AT SOIL SAMPLE LOCATIONS
SCHOTE CREEK
WELDON SPRING, MISSOURI

Location[a] (m)		Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)
0	1R	7	8
100	1L	8	8
200	1R	8	8
300	1L	8	8
400	1R	8	8
500	1L	8	8
600	1R	7	7
700	1L	7	8
727	1R	7	7

[a]Refer to Figure 4.

TABLE 24

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT SAMPLES COLLECTED AT 100 M INTERVALS ALONG SCHOTE CREEK WELDON SPRING, MISSOURI

Location[a] (m)		Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
0	R	0.93 ± 0.22[b]	1.30 ± 1.74	1.14 ± 0.34
100	L	0.83 ± 0.20	<0.88	1.04 ± 0.34
200,	R	0.60 ± 0.12	1.28 ± 0.70	0.83 ± 0.23
300,	L	0.77 ± 0.24	1.20 ± 1.73	0.99 ± 0.32
400,	R	1.20 ± 0.25	1.54 ± 1.51	1.40 ± 0.46
500,	L	0.58 ± 0.19	0.84 ± 0.64	0.58 ± 0.22
600	L	0.45 ± 0.21	1.16 ± 1.18	0.57 ± 0.46
727,	R	0.44 ± 0.14	0.57 ± 0.59	0.86 ± 0.56

[a] Refer to Figures 4.

[b] Errors are 2σ based on counting statistics.

TABLE 25

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT SAMPLES
FROM ARMY PROPERTY PONDS
WELDON SPRING, MISSOURI

Location[a]	Radionuclide Concentrations (pCi/g)		
	Ra-226	U-238	Th-232
Pond Off Railroad #2 (North Bank)	0.54 ± 0.19[b]	0.78 ± 1.21	0.36 ± 0.40
Pond Off Road #6 (West Bank)	1.02 ± 0.27	10.3 ± 2.2	1.43 ± 0.47

[a] Refer to Figure 4.
[b] Errors are 2σ based on counting statistics.

TABLE 26

RADIONUCLIDE CONCENTRATIONS IN SPLIT SPOON SOIL SAMPLES
COLLECTED FROM BOREHOLES ON THE ARMY RESERVE PROPERTY
WELDON SPRING, MISSOURI

Borehole[a] Location	Depth (cm)	Radionuclide Concentration (pCi/g)		
		Ra-226	U-238	Th-232
63	0 - 60	1.33 ± 0.46[b]	1.73 ± 1.29	1.15 ± 0.71
	90 - 120	1.11 ± 0.28	<0.85	1.22 ± 0.48
	120 - 150	1.53 ± 0.36	3.15 ± 1.70	1.95 ± 0.60
	240 - 270	0.67 ± 0.24	<0.84	1.49 ± 0.42
	270 - 300	0.83 ± 0.32	2.34 ± 1.88	1.68 ± 0.91
	390 - 420	0.85 ± 0.30	<0.87	1.50 ± 0.47
	420 - 450	0.88 ± 0.29	3.34 ± 1.11	2.02 ± 0.51
	540 - 550	0.85 ± 0.30	<0.92	0.61 ± 0.57
64	0 - 30	1.24 ± 0.49	<1.32	1.63 ± 0.87
	30 - 60	0.97 ± 0.29	1.69 + 2.09	1.65 ± 0.45
	90 - 120	1.16 ± 0.38	2.79 + 1.36	1.95 ± 0.70
	120 - 150	1.32 ± 0.33	1.46 + 1.54	1.12 ± 0.78
	240 - 270	0.96 ± 0.31	1.81 + 1.72	1.44 ± 0.73
	270 - 300	1.04 ± 0.29	1.68 ± 1.54	1.37 ± 0.52
	390 - 420	0.88 ± 0.35	1.28 ± 0.82	1.29 ± 0.49
	420 - 450	1.07 ± 0.42	<1.12	1.89 ± 0.62
65	0 - 30	1.06 ± 0.34	1.71 ± 1.50	1.17 ± 0.57
	30 - 60	1.17 ± 0.30	8.87 ± 2.80	2.13 ± 0.61
	90 - 120	1.18 ± 0.29	3.45 ± 1.28	1.48 ± 0.52
	120 - 150	1.25 ± 0.30	1.18 ± 1.52	1.60 ± 0.48
	240 - 270	0.90 ± 0.26	1.16 ± 0.78	1.35 ± 0.55
	270 - 300	0.63 ± 0.30	1.62 ± 1.64	1.25 ± 0.65
66	0 - 30	1.21 ± 0.35	2.18 ± 1.73	1.42 ± 0.57
	30 - 60	1.19 ± 0.35	1.93 ± 1.46	1.96 ± 0.56
	90 - 120	1.66 ± 0.36	<1.22	1.06 ± 0.75
	120 - 150	1.86 ± 0.35	6.79 ± 1.60	1.57 ± 0.71
	240 - 270	0.98 ± 0.28	1.44 ± 1.68	2.01 ± 0.55
	270 - 300	0.71 ± 0.28	1.98 ± 1.67	1.16 ± 0.51
	390 - 405	1.24 ± 0.57	3.34 ± 1.65	2.30 ± 0.74
	540 - 555	1.46 ± 0.99	3.41 ± 6.78	2.69 ± 2.21
67	0 - 30	0.99 ± 0.32	3.32 ± 2.78	<0.21
	30 - 60	1.02 ± 0.37	4.85 ± 1.70	1.45 ± 0.92
	90 - 120	1.08 ± 0.34	<0.87	1.01 ± 0.56
	120 - 150	0.59 ± 0.35	1.60 ± 2.06	1.20 ± 0.72
	240 - 270	0.75 ± 0.25	<0.81	1.19 ± 0.39
	270 - 300	1.13 ± 0.33	<0.88	1.24 ± 0.61
	390 - 420	0.32 ± 0.25	<0.88	1.09 ± 0.48
	420 - 450	0.54 ± 0.29	0.86 ± 1.76	1.11 ± 0.41

TABLE 26 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SPLIT SPOON SOIL SAMPLES
COLLECTED FROM BOREHOLES ON THE ARMY RESERVE PROPERTY
WELDON SPRING, MISSOURI

Borehole Location	Depth (cm)	Radionuclide Concentration (pCi/g) Ra-226	U-238	Th-232
68	0 - 30	1.24 ± 0.29	3.93 ± 2.66	1.66 ± 0.89
	30 - 60	1.00 ± 0.43	6.00 ± 2.67	1.41 ± 0.67
	90 - 120	0.85 ± 0.27	1.16 ± 2.13	1.15 ± 0.49
	120 - 150	0.83 ± 0.32	<0.79	1.45 ± 0.71
	240 - 255	0.32 ± 0.28	<0.63	0.55 ± 0.30
	390 - 450	0.25 ± 0.21	1.90 ± 1.29	0.30 ± 0.43
	540 - 570	0.37 ± 0.23	<0.71	0.32 ± 0.32
69	0 - 30	0.97 ± 0.33	2.03 ± 1.02	0.80 ± 0.36
	30 - 60	0.58 ± 0.27	0.71 ± 1.35	0.98 ± 0.39
	90 - 120	0.79 ± 0.26	1.93 ± 1.09	1.18 ± 0.41
	120 - 150	0.74 ± 0.26	0.62 ± 0.93	1.39 ± 0.47
	240 - 270	1.01 ± 0.30	1.52 ± 0.95	1.74 ± 0.52
	270 - 300	1.11 ± 0.34	1.34 ± 1.33	1.54 ± 0.48
	390 - 420	0.82 ± 0.28	1.42 ± 1.19	1.08 ± 0.41
	420 - 450	0.67 ± 0.36	<0.65	1.09 ± 0.44
	540 - 545	1.52 ± 0.85	2.82 ± 1.98	<0.72
70	0 - 30	1.00 ± 0.27	<0.91	1.11 ± 0.42
	30 - 60	1.24 ± 0.40	3.49 ± 1.09	1.62 ± 0.87
	90 - 120	1.42 ± 0.38	2.00 ± 1.67	1.47 ± 0.63
	120 - 150	1.20 ± 0.36	2.53 ± 1.48	1.77 ± 0.58
	240 - 270	1.20 ± 0.29	2.01 ± 1.32	1.31 ± 0.70
	270 - 300	0.83 ± 0.27	1.37 ± 1.76	1.38 ± 0.78
	390 - 420	0.68 ± 0.29	<0.73	0.88 ± 0.49
	420 - 450	0.64 ± 0.32	0.34 ± 0.78	
71	0 - 30	0.94 ± 0.31	<0.86	1.03 ± 0.58
	30 - 60	1.01 ± 0.35	1.06 ± 0.75	0.25 ± 0.37
	90 - 120	1.11 ± 0.35	1.18 ± 1.83	1.22 ± 0.56
	120 - 150	1.55 ± 0.33	2.53 ± 1.04	1.34 ± 0.64
	240 - 270	0.74 ± 0.29	<0.79	0.86 ± 0.34
	390 - 420	0.64 ± 0.23	1.84 ± 0.77	1.56 ± 0.48
	420 - 450	0.81 ± 0.24	0.89 ± 1.64	1.02 ± 0.38
	540 - 570	0.49 ± 0.34	<0.86	1.58 ± 0.43
	570 - 600	0.62 ± 0.27	1.21 ± 1.62	0.68 ± 0.60
	690 - 720	1.32 ± 0.33	2.29 ± 1.50	2.11 ± 0.69
	720 - 750	2.11 ± 0.38	9.88 ± 2.66	2.58 ± 0.67
	840 - 870	1.35 ± 0.40	2.49 ± 1.46	2.71 ± 0.57
	870 - 900	1.18 ± 0.29	<0.98	2.10 ± 0.74
	990 - 102	1.28 ± 0.30	2.09 ± 1.36	1.79 ± 0.47
	1140 - 1155	0.58 ± 0.28	0.92 ± 1.40	1.39 ± 0.47

TABLE 26 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SPLIT SPOON SOIL SAMPLES
COLLECTED FROM BOREHOLES ON THE ARMY RESERVE PROPERTY
WELDON SPRING, MISSOURI

Borehole Location	Depth (cm)	Radionuclide Concentration (pCi/g)		
		Ra-226	U-238	Th-232
72	0 - 30	0.88 ± 0.27	0.66 ± 0.66	0.76 ± 0.41
	30 - 60	1.27 ± 0.26	1.91 ± 1.34	1.29 ± 0.37
	90 - 120	1.16 ± 0.37	2.77 ± 1.67	1.60 ± 0.78
	120 - 150	1.04 ± 0.27	1.84 ± 1.66	1.52 ± 0.57
	240 - 270	1.03 ± 0.34	1.02 ± 1.57	1.41 ± 0.48
	270 - 300	0.89 ± 0.23	1.14 ± 1.63	1.41 ± 0.67
	390 - 420	0.82 ± 0.36	1.87 ± 0.85	1.26 ± 0.49
	420 - 450	0.66 ± 0.20	<0.70	1.17 ± 0.46
	540 - 550	0.63 ± 0.56	3.51 ± 1.41	1.25 ± 0.63
73	0 - 30	0.63 ± 0.43	<0.78	0.97 ± 0.54
	30 - 60	0.44 ± 0.17	1.71 ± 0.80	0.51 ± 0.26
	90 - 120	0.71 ± 0.23	3.09 ± 1.76	0.83 ± 0.39
	120 - 150	0.42 ± 0.17	<0.79	<0.25
	240 - 270	0.61 ± 0.20	3.28 ± 1.46	0.67 ± 0.63
	270 - 300	0.40 ± 0.33	1.53 ± 1.37	1.21 ± 0.49
	390 - 450	0.38 ± 0.22	<0.68	0.81 ± 0.30
	540 - 570	0.56 ± 0.21	1.70 ± 0.89	1.45 ± 0.59
	570 - 600	0.59 ± 0.30	<0.78	1.05 ± 0.44
	690 - 720	0.69 ± 0.21	1.33 ± 1.26	0.86 ± 0.55
	720 - 750	0.63 ± 0.35	<0.72	1.05 ± 0.53
	840 - 870	0.53 ± 0.27	0.30 ± 0.59	0.89 ± 0.41
	870 - 900	0.64 ± 0.33	<0.83	1.44 ± 0.47
	990 - 1020	1.50 ± 0.29	2.16 ± 0.80	1.07 ± 0.37
74	0 - 30	1.37 ± 0.53	3.05 ± 1.24	1.63 ± 0.90
	30 - 60	0.91 ± 0.32	1.97 ± 1.47	1.70 ± 0.49
	90 - 120	0.89 ± 0.25	2.06 ± 1.19	1.28 ± 0.36
	120 - 150	0.83 ± 0.28	0.55 ± 2.13	1.24 ± 0.41
	240 - 270	0.93 ± 0.23	0.93 ± 1.24	1.40 ± 0.46
	270 - 300	0.79 ± 0.26	<0.80	1.66 ± 0.41
	390 - 420	0.78 ± 0.30	0.65 ± 0.73	1.33 ± 0.77
	420 - 450	0.69 ± 0.20	1.27 ± 1.40	0.88 ± 0.46
	540 - 570	0.71 ± 0.34	1.50 ± 1.32	0.93 ± 0.40
	570 - 600	0.75 ± 0.21	4.09 ± 1.23	1.59 ± 0.53
	690 - 720	0.75 ± 0.35	<0.89	1.15 ± 0.48
	720 - 750	0.97 ± 0.38	<1.23	1.49 ± 0.73
	840 - 870	0.76 ± 0.27	1.87 ± 1.24	1.07 ± 0.56
	870 - 900	0.85 ± 0.21	1.87 ± 1.19	0.93 ± 0.49
	990 - 1020	0.90 ± 0.30	1.24 ± 1.86	1.51 ± 0.51
	1020 - 1050	0.58 ± 0.26	<0.76	1.54 ± 0.54
	1140 - 1170	0.61 ± 0.22	1.37 ± 1.27	1.56 ± 0.54

TABLE 26 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SPLIT SPOON SOIL SAMPLES
COLLECTED FROM BOREHOLES ON THE ARMY RESERVE PROPERTY
WELDON SPRING, MISSOURI

Borehole Location	Depth (cm)	Radionuclide Concentration (pCi/g) Ra-226	U-238	Th-232
	1170 - 1200	0.63 ± 0.22	0.94 ± 1.36	1.42 ± 0.41
	1290 - 1320	0.74 ± 0.30	1.42 ± 1.43	0.83 ± 0.43
	1320 - 1350	0.82 ± 0.25	3.37 ± 1.55	1.04 ± 0.65
	1440 - 1470	2.18 ± 0.39	2.10 ± 1.39	1.07 ± 0.66
	1470 - 1500	1.91 ± 0.37	6.41 ± 2.49	1.36 ± 0.55
	1590 - 1620	1.19 ± 0.27	1.51 ± 1.10	1.44 ± 0.47
	1620 - 2650	1.02 ± 0.34	<0.91	1.79 ± 0.43
75	0 - 30	<0.50	1.43 ± 1.06	1.74 ± 0.76
	30 - 60	1.15 ± 0.33	1.16 ± 2.19	2.38 ± 0.66
	90 - 120	1.55 ± 0.43	2.33 ± 2.17	1.56 ± 0.58
	120 - 150	1.04 ± 0.37	<1.14	1.31 ± 0.68
	240 - 270	0.82 ± 0.22	0.56 ± 0.65	1.37 ± 0.58
	270 - 300	0.99 ± 0.32	<0.97	1.76 ± 0.64
	390 - 420	0.93 ± 0.24	1.44 ± 0.79	1.43 ± 0.61
	420 - 450	0.79 ± 0.31	<0.87	0.75 ± 0.55
	540 - 570	0.59 ± 0.36	1.40 ± 1.28	1.39 ± 0.64
	570 - 600	0.83 ± 0.41	1.11 ± 0.86	1.09 ± 0.44
	690 - 720	0.52 ± 0.36	<0.99	1.45 ± 0.52
76	0 - 30	0.96 ± 0.31	<0.83	1.59 ± 0.58
	30 - 60	1.01 ± 0.30	1.40 ± 1.66	0.51 ± 0.96
	120 - 150	0.85 ± 0.28	1.12 ± 1.51	1.56 ± 0.50
	120 - 150	0.94 ± 0.32	2.30 ± 0.96	1.46 ± 0.59
	240 - 270	0.94 ± 0.28	0.90 ± 1.81	1.37 ± 0.56
	270 - 300	0.78 ± 0.28	1.89 ± 1.47	1.00 ± 0.36
	390 - 420	0.63 ± 0.21	<0.64	0.61 ± 0.38
	420 - 450	0.60 ± 0.29	1.38 ± 1.09	1.29 ± 0.41
	540 - 570	0.89 ± 0.40	<1.22	1.68 ± 0.67
	570 - 600	0.92 ± 0.40	1.82 ± 0.93	1.42 ± 0.92
	690 - 720	0.48 ± 0.27	<0.66	0.78 ± 0.41
	720 - 750	0.33 ± 0.19	0.93 ± 0.97	0.54 ± 0.35
	840 - 870	0.65 ± .22	<0.64	1.05 ± 0.39
	870 - 900	0.91 ± 0.35	1.38 ± 0.87	0.96 ± 0.71
	990 - 1020	0.82 ± 0.31	1.78 ± 1.20	1.37 ± 0.57
	1020 - 1050	1.33 ± 0.30	3.02 ± 1.45	1.41 ± 0.55
	1140 - 1170	0.75 ± 0.38	<1.12	1.12 ± 0.43
	1170 - 1200	1.25 ± 0.32	<0.93	1.10 ± 0.57
77	0 - 30	0.58 ± 0.27	0.97 ± 1.95	0.63 ± 0.38
	30 - 60	0.82 ± 0.27	<0.62	0.35 ± 0.28
	90 - 120	1.31 ± 0.35	2.73 ± 1.01	1.61 ± 0.60

TABLE 26 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SPLIT SPOON SOIL SAMPLES
COLLECTED FROM BOREHOLES ON THE ARMY RESERVE PROPERTY
WELDON SPRING, MISSOURI

Borehole Location	Depth (cm)	Radionuclide Concentration (pCi/g)		
		Ra-226	U-238	Th-232
77	120 - 150	0.80 ± 0.25	1.04 ± 1.80	1.35 ± 0.54
	240 - 270	0.70 ± 0.30	1.60 ± 1.07	0.82 ± 0.50
	270 - 300	0.93 ± 0.36	2.01 ± 1.95	1.42 ± 0.46
	390 - 420	0.82 ± 0.20	2.77 ± 1.02	1.40 ± 0.41
	420 - 450	0.70 ± 0.50	1.79 ± 1.41	0.97 ± 0.51
	540 - 570	1.55 ± 0.28	1.40 ± 1.38	1.64 ± 0.40
	570 - 600	1.04 ± 0.37	1.76 ± 1.92	1.83 ± 0.57
	690 - 720	0.94 ± 0.22	1.62 ± 1.52	0.97 ± 0.43
	720 - 750	1.07 ± 0.38	1.23 ± 1.42	1.15 ± 0.79
78	0 - 30	0.86 ± 0.30	1.16 ± 2.23	0.50 ± 0.25
	30 - 60	0.61 ± 0.20	1.11 ± 0.93	<0.24
	90 - 120	0.94 ± 0.28	1.22 ± 1.10	0.88 ± 0.35
	120 - 150	1.12 ± 0.26	1.34 ± 1.31	0.56 ± 0.54
	240 - 270	1.15 ± 0.22	1.10 ± 1.08	1.05 ± 0.36
	270 - 300	1.32 ± 0.33	1.57 ± 0.84	1.36 ± 0.59
	390 - 420	0.80 ± 0.25	<0.78	0.89 ± 0.33
	420 - 450	0.82 ± 0.30	<1.12	0.23 ± 0.28
	540 - 570	0.70 ± 0.38	0.98 ± 2.01	1.11 ± 0.37
	570 - 600	0.76 ± 0.22	1.66 ± 1.42	0.95 ± 0.54
	690 - 705	0.19 ± 0.15	0.85 ± 1.17	<0.16
	840 - 870	0.41 ± 0.31	0.79 ± 1.68	0.77 ± 0.33
	870 - 900	<0.15	<0.77	<0.27
	1020 - 1050	1.17 ± 0.26	1.39 ± 1.34	1.74 ± 0.50
79	0 - 30	1.33 ± 0.37	2.34 ± 2.18	1.19 ± 0.55
	30 - 60	<0.24	<1.04	1.14 ± 0.51
	90 - 120	0.98 ± 0.41	1.03 ± 2.85	1.57 ± 0.50
	120 - 150	1.19 ± 0.39	0.93 ± 1.00	0.98 ± 0.66
	240 - 270	0.62 ± 0.37	1.66 ± 1.76	0.85 ± 0.38
	270 - 300	0.69 ± 0.29	2.32 ± 0.84	1.45 ± 0.53
	390 - 420	1.04 ± 0.44	2.08 ± 1.86	1.17 ± 0.53
80	0 - 30	1.43 ± 0.47	4.12 ± 1.26	1.22 ± 0.86
	30 - 60	0.95 ± 0.26	<0.80	1.45 ± 0.52
	90 - 120	1.09 ± 0.34	<1.08	1.74 ± 0.87
	120 - 150	1.26 ± 0.39	2.31 ± 1.75	1.52 ± 0.80
	240 - 270	<0.15	3.08 ± 1.82	1.07 ± 0.40
	270 - 300	0.74 ± 0.22	1.28 ± 0.75	1.89 ± 0.48
	390 - 420	0.91 ± 0.33	<0.98	2.03 ± 0.51
	420 - 450	0.77 ± 0.38	<1.13	1.22 ± 0.48
	540 - 570	0.67 ± 0.22	1.98 ± 1.21	0.61 ± 0.33

TABLE 26 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SPLIT SPOON SOIL SAMPLES
COLLECTED FROM BOREHOLES ON THE ARMY RESERVE PROPERTY
WELDON SPRING, MISSOURI

Borehole Location	Depth (cm)	Radionuclide Concentration (pCi/g)		
		Ra-226	U-238	Th-232
82	0 - 30	1.09 ± 0.42	1.65 ± 2.36	1.12 ± 0.46
	30 - 60	1.89 ± 0.46	6.11 ± 2.66	0.70 ± 0.85
	90 - 120	1.07 ± 0.33	<2.67	1.32 ± 0.76
	120 - 150	3.07 ± 0.51	<1.22	0.74 ± 0.62
	240 - 270	0.34 ± 0.42	1.64 ± 0.73	0.69 ± 0.52
	270 - 300	0.46 ± 0.24	<0.65	<0.26
	370 - 420	0.30 ± 0.19	0.97 ± 1.06	0.68 ± 0.40
	420 - 450	<0.18	<1.01	0.78 ± 0.62
	540 - 570	0.64 ± 0.32	1.17 ± 1.86	<0.38
	570 - 600	<0.28	<1.07	<0.37

[a]Refer to Figure 3.
[b]Errors are 2σ based on counting statistics.

APPENDIX A

Major Sampling and Analytical Equipment

The display or description of a specific product is not to be construed as an endorsement of that product or its manufacturer by the authors or their employer.

A. Direct Radiation Measurements

Eberline RASCAL
Portable Scaler/Ratemeter
Model PRS-1
(Eberline, Sante Fe, NM)

Eberline PRM-6
Portable Ratemeter
(Eberline, Sante Fe, NM)

Eberline Alpha Scintillation Probe
Model AC-3-7
(Eberline, Sante Fe, NM)

Eberline Beta-Gamma Pancake Probe
Model HP-260
(Eberline, Sante Fe, NM)

Victoreen NaI Gamma Scintillation Probe
Model 489-55
(Victoreen, Cleveland, OH)

Reuter-Stokes Pressurized Ionization Chamber
Model RSS-111
(Reuter-Stokes, Cleveland, OH)

Ludlum Portable Scaler
Model 2200
(Ludlum, Sweetwater, TX)

B. Laboratory Analysis

Automatic low-background Alpha-Beta Counter
Model LB5110-2080
(Tennelec, Inc., Oak Ridge, TN)

Ge(Li) Detectors (2)
Model LGCC2220SD, 23% efficiency
(Princeton Gamma-Tech, Princeton, NJ)

Used in conjunction with:
Lead Shield, SPG-16
(Applied Physical Technology Smyrna, GA)

High-Purity Germanium Detector
Model GMX-23195-S, 23% efficiency
(EG&G ORTEC, Oak Ridge, TN)

Used in conjunction with:
Lead Shield, G-16
(Gamma Products, Inc., Palos Hills, IL)

ND-66/ND-680 System
(Nuclear Data, Inc., Schaumburg, IL)

Alpha Spectrometry System
Tennelec Electronics, EG&G ORTEC
Surface barrier detectors
(Tennelec, Inc., EG&G, Oak Ridge, TN)

Radon Emanation System
Counter/Timer, Model 2071
Single Channel Analyzer, Model 2031
High Voltage Power Supply, Model 3102
(Canberra Industries, Meriden, CT)

Tennelec Linear Amplifier
Model TC 202BLR
(Tennelec, Inc., Oak Ridge, TN)

Radon Bubblers and Lucas Cells
(Rocky Mountain Scientific Glass Blowing, Co., Aurora, CO)

APPENDIX B

MEASUREMENT AND ANALYTICAL PROCEDURES

APPENDIX B

Measurement and Analytical Procedures

Gamma Scintillation Measurement

Walkover surface scans and measurements of gamma exposure rates were performed using Eberline Model PRM-6 portable ratemeters with Victoreen Model 489-55 gamma scintillation probes containing 3.2 cm x 3.8 cm NaI(Tl) scintillation crystals. Count rates were converted to exposure rates (μR/h) using factors determined by comparing the response of the scintillation detector with that of a Reuter Stokes model RSS-111 pressurized ionization chamber at locations on the Busch Wildlife and Weldon Spring Wildlife areas.

Alpha and Beta-Gamma Measurements

Measurements of total alpha radiation levels were performed using Eberline Model PRS-1 portable scaler/ratemeters with Model AC-3-7 alpha scintillation probes. Measurements of direct beta-gamma radiation levels were performed using Eberline Model PRS-1 portable scaler/ratemeters with Model HP-260 thin-window pancake G-M probes. Count rates (cpm) were converted to disintegration rates (dpm/100 cm^2) by dividing the net rate by the 4π efficiency and correcting for active area of the detector. The effective window area is 59 cm^2 for the ZnS detectors and 15 cm^2 for the G-M detectors. The average background count rate was 40 cpm for the G-M probes and approximately 2 cpm for the ZnS alpha probes.

Beta and gamma dose rates were calculated individually and the results summed for a combined beta-gamma dose rate. Beta dose rates were calculated by applying the conversion factor of 1400 cpm/mrad/h to the net beta count rate.

Borehole Logging

Borehole gamma radiation measurements were performed using a Victoreen Model 489-55 gamma scintillation probe connected to a Ludlum Model 2200 portable scaler. The scintillation probe was shielded by a 1.25 cm thick lead shield with four 2.5 cm x 7 mm holes evenly spaced around the region of the scintillation crystal. The probe was lowered into each hole using a tripod holder with a small winch. Measurements were performed at 30 cm intervals in all holes. The logging data were used to identify regions of possible residues and guide the selection of subsurface soil sampling locations.

Soil and Sediment Sample Analysis

Gamma Spectrometry

Soil and sediment samples were dried, mixed, and a portion placed in a 0.5 L Marinelli beaker. The quantity placed in each beaker was chosen to reproduce the calibrated counting geometry and ranged from 600 to 800 g of soil. Net soil weights were determined and the samples counted using intrinsic germanium and Ge(Li) detectors coupled to a Nuclear Data Model ND-680 pulse height analyzer system. Background and Compton stripping, peak search, peak identification, and concentration calculations were performed using the computer capabilities inherent in the analyzer system. Energy peaks used for determination of radionuclides of concern were:

Ra-226 - 0.609 MeV from Bi-214 (secular equilibrium assumed)
Th-232 - 0.911 MeV from Ac-228 (secular equilibrium assumed)
U-238 - 0.094 MeV from Th-234 (secular equilibrium assumed)
or 1.001 MeV from Pa-234 (secular equilibrium assumed)

Alpha Spectrometry: Th-230

Thorium was separated by a process of high temperature fusion, acid dissolution, precipitation, redissolution, and solvent extraction. The thorium was then precipitated with cerium fluoride onto counting discs. Surface barrier detectors coupled to a Nuclear Data Model ND 680 pulse height analyzer enabled identification of the characteristic Th-230 energy peak (4.68 MeV) and activity determination.

Water Sample Analysis

Water samples were rough-filtered through Whatman No. 2 filter paper. Remaining suspended solids were removed by subsequent filtration through

0.45 μm membrane filters. The filtrate was acidified by addition of 10 ml of concentrated nitric acid. A known volume of each sample was evaporated to dryness and counted for gross alpha and gross beta using a Tennelec Model LB-5110 low-background proportional counter.

Analysis for Ra-226 and Ra-228 was performed using the standard technique EPA 600/4-80-032.

Uranium and thorium isotopic analyses were performed by taking aliquots of liquid, then acidifying and evaporating to dryness. The residue was dissolved by pyrosulfate fusion and precipitated with barium sulfate. The barium sulfate precipitate was redissolved and the uranium and thorium separated by liquid - liquid extraction. The uranium and thorium were then precipitated with a cerium fluoride carrier and counted using surface barrier detectors (ORTEC), alpha spectrometers (Tennelec), and an ND-66 Multichannel Analyzer (Nuclear Data).

Removable Contamination Measurements

Smear measurements were performed on numbered filter paper disks, 47 mm in diameter. Each smear was sealed in a labeled envelope with the location and other pertinent information recorded. A low-background alpha-beta counting system was used to count individual smears.

Errors and Detection Limits

The uncertainties associated with the analytical data, presented in the tables of this report, represent the 95% (2σ) confidence levels based only on counting statistics. Other sources of error associated with the sampling and analyses introduce an additional uncertainty of ± 6 to 10% in the results.

Calibration and Quality Assurance

Laboratory and field survey procedures are documented in manuals developed specifically for the Oak Ridge Associated Universities Radiological Site Assessment Program.

With the exception of the measurements conducted with portable gamma scintillation survey meters, instruments were calibrated with NBS-traceable standards. The calibration procedures for the portable gamma instruments are performed by comparison with an NBS calibrated pressurized ionization chamber.

Quality control procedures on all instruments included daily background and check-source measurements to confirm equipment operation within acceptable statistical fluctuations. The ORAU laboratory participates in the EPA and EML Quality Assurance Programs.

APPENDIX C

SUMMARY OF RADIATION GUIDELINES APPLICABLE TO VICINITY PROPERTIES AT THE WELDON SPRING CHEMICAL PLANT SITE

U.S. DEPARTMENT OF ENERGY GUIDELINES
FOR RESIDUAL RADIOACTIVITY AT
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM
AND
REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM SITES

(Rev. 1, July 1985)

A. INTRODUCTION

This document presents U.S. Department of Energy (DOE) radiological protection guidelines for cleanup of residual radioactive materials and management of the resulting wastes and residues. It is applicable to sites identified by the Formerly Utilized Sites Remedial Action Program (FUSRAP) and remote sites identified by the Surplus Facilities Management Program (SFMP).* The topics covered are basic dose limits, guidelines and authorized limits for allowable levels of residual radioactivity, and requirements for control of the radioactive wastes and residues.

Protocols for identification, characterization, and designation of FUSRAP sites for remedial action; for implementation of the remedial action; and for certification of a FUSRAP site for release for unrestricted use are given in a separate document (U.S. Dept. Energy 1984). More detailed information on applications of the guidelines presented herein, including procedures for deriving site-specific guidelines for allowable levels of residual radioactivity from basic dose limits, is contained in a supplementary document--referred to herein as the "supplement" (U.S. Dept. Energy 1985).

"Residual radioactivity" includes: (1) residual concentrations of radionuclides in soil material,** (2) concentrations of airborne radon decay products, (3) external gamma radiation level, and (4) surface contamination. A "basic dose limit" is a prescribed standard from which limits for quantities that can be monitored and controlled are derived; it is specified in terms of the effective dose equivalent as defined by the International Commission on Radiological Protection (ICRP 1977, 1978). Basic dose limits are used explicitly for deriving guidelines for residual concentrations of radionuclides in soil material, except for thorium and radium. Guidelines for

*A remote SFMP site is one that is excess to DOE programmatic needs and is located outside a major operating DOE research and development or production area.

**The term "soil material" refers to all material below grade level after remedial action is completed.

residual concentrations of thorium and radium and for the other three quantities (airborne radon decay products, external gamma radiation level, and surface contamination) are based on existing radiological protection standards (U.S. Environ. Prot. Agency 1983; U.S. Nucl. Reg. Comm. 1982). These standards are assumed to be consistent with basic dose limits within the uncertainty of derivations of levels of residual radioactivity from basic limits.

A "guideline" for residual radioactivity is a level of residual radioactivity that is acceptable if the use of the site is to be unrestricted. Guidelines for residual radioactivity presented herein are of two kinds: (1) generic, site-independent guidelines taken from existing radiation protection standards, and (2) site-specific guidelines derived from basic dose limits using site-specific models and data. Generic guideline values are presented in this document. Procedures and data for deriving site-specific guideline values are given in the supplement.

An "authorized limit" is a level of residual radioactivity that must not be exceeded if the remedial action is to be considered completed. Under normal circumstances, expected to occur at most sites, authorized limits for residual radioactivity are set equal to guideline values. Exceptional conditions for which authorized limits might differ from guideline values are specified in Sections D and F. A site may be released for unrestricted use only if the residual radioactivity does not exceed guideline values at the time remedial action is completed. Restrictions and controls on use of the site must be established and enforced if the residual radioactivity exceeds guideline values. The applicable controls and restrictions are specified in Section E.

DOE policy requires that all exposures to radiation be limited to levels that are as low as reasonably achievable (ALARA). Implementation of ALARA policy is specified as procedures to be applied after authorized limits have been set. For sites to be released for unrestricted use, the intent is to reduce residual radioactivity to levels that are as far below authorized limits as reasonable considering technical, economic, and social factors. At sites where the residual radioactivity is not reduced to levels that permit release for unrestricted use, ALARA policy is implemented by establishing controls to reduce exposure to levels that are as low as is reasonably achievable. Procedures for implementing ALARA policy are described in the supplement. ALARA policies, procedures, and actions must be documented and filed as a permanent record upon completion of remedial action at a site.

B. BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 500 mrem/yr for a period of exposure not to exceed 5 years and an average of 100 mrem/yr over a lifetime. The committed effective dose equivalent, as defined in ICRP Publication 26 (ICRP 1977) and calculated by dosimetry models described in ICRP Publication 30 (ICRP 1978), shall be used for determining the dose.

C. GUIDELINES FOR RESIDUAL RADIOACTIVITY

C.1 Residual Radionuclides in Soil Material

Residual concentrations of radionuclides in soil material shall be specified as above-background concentrations averaged over an area of 100 m^2. If the concentration in any area is found to exceed the average by a factor greater than 3, guidelines for local concentrations shall also be applicable. These "hot spot" guidelines depend on the extent of the elevated local concentrations and are given in the supplement.

The generic guidelines for residual concentrations of Th-232, Th-230, Ra-228, and Ra-226 are:

- 5 pCi/g, averaged over the first 15 cm of soil below the surface
- 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface

These guidelines take into account ingrowth of Ra-226 from Th-230 and of Ra-228 from Th-232, and assume secular equilibrium. If either Th-230 and Ra-226 or Th-232 and Ra-228 are both present, not in secular equilibrium, the guidelines apply to the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that the dose for the mixtures will not exceed the basic dose limit. Explicit formulas for calculating residual concentration guidelines for mixtures are given in the supplement.

The guidelines for residual concentrations in soil material of all other radionuclides shall be derived from basic dose limits by means of an environmental pathway analysis using site-specific data. Procedures for deriving these guidelines are given in the supplement.

C.2 Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that are intended for unrestricted use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR 192) is: In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL.* In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive materials are not the cause.

C.3 External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site to be released for unrestricted use shall not exceed the background level by more than 20 μR/h.

*A working level (WL) is any combination of short-lived radon decay products in one liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy.

C.4 Surface Contamination

The following generic guidelines, adapted from standards of the U.S. Nuclear Regulatory Commission (1982), are applicable only to existing structures and equipment that will not be demolished and buried. They apply to both interior and exterior surfaces. If a building is demolished and buried, the guidelines in Section C.1 are applicable to the resulting contamination in the ground.

Radionuclides†2	Allowable Total Residual Surface Contamination (dpm/100 cm^2)†1		
	Average†3,†4	Maximum†4,†5	Removable†4,†6
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products	5,000α	15,000α	1,000α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000β-γ	15,000β-γ	1,000β-γ

†1 As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

†2 Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

†3 Measurements of average contamination should not be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.

†4 The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

†5 The maximum contamination level applies to an area of not more than 100 cm^2.

†6 The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

D. AUTHORIZED LIMITS FOR RESIDUAL RADIOACTIVITY

The remedial action shall not be considered complete unless the residual radioactivity is below authorized limits. Authorized limits shall be set equal to guidelines for residual radioactivity unless: (1) exceptions specified in Section F of this document are applicable, in which case an authorized limit may be set above the guideline value for the specific location or condition to which the exception is applicable; or (2) on the basis of site-specific data not used in establishing the guidelines, it can be clearly established that limits below the guidelines are reasonable and can be achieved without appreciable increase in cost of the remedial action. Authorized limits that differ from guidelines must be justified and established on a site-specific basis, with documentation that must be filed as a permanent record upon completion of remedial action at a site. Authorized limits differing from the guidelines must be approved by the Director, Oak Ridge Technical Services Division, for FUSRAP and by the Director, Richland Surplus Facilities Management Program Office, for remote SFMP--with concurrence by the Director of Remedial Action Projects for both programs.

E. CONTROL OF RESIDUAL RADIOACTIVITY AT FUSRAP AND REMOTE SFMP SITES

Residual radioactivity above the guidelines at FUSRAP and remote SFMP sites must be managed in accordance with applicable DOE Orders. The DOE Order 5480.1A requires compliance with applicable federal, state, and local environmental protection standards.

The operational and control requirements specified in the following DOE Orders shall apply to interim storage, interim management, and long-term management.

a. 5440.1B, Implementation of the National Environmental Policy Act

b. 5480.1A, Environmental Protection, Safety, and Health Protection Program for DOE Operations

c. 5480.2, Hazardous and Radioactive Mixed Waste Management

d. 5480.4, Environmental Protection, Safety, and Health Protection Standards

e. 5482.1A, Environmental, Safety, and Health Appraisal Program

f. 5483.1, Occupational Safety and Health Program for Government-Owned Contractor-Operated Facilities

g. 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements

h. 5484.2, Unusual Occurrence Reporting System

i. 5820.2, Radioactive Waste Management

E.1 Interim Storage

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 50 years and, in any case, at least 25 years.

b. Above-background Rn-222 concentrations in the atmosphere above facility surfaces or openings shall not exceed: (1) 100 pCi/L at any given point, (2) an annual average concentration of 30 pCi/L over the facility site, and (3) an annual average concentration of 3 pCi/L at or above any location outside the facility site (DOE Order 5480.1A, Attachment XI-1).

c. Concentrations of radionuclides in the groundwater or quantities of residual radioactive materials shall not exceed existing federal, state, or local standards.

d. Access to a site shall be controlled and misuse of onsite material contaminated by residual radioactivity shall be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These control features should be designed to ensure, to the extent reasonable, an effective life of at least 25 years. The federal government shall have title to the property.

E.2 Interim Management

a. A site may be released under interim management when the residual radioactivity exceeds guideline values if the residual radioactivity is in inaccessible locations and would be unreasonably costly to remove, provided that administrative controls are established to ensure that no member of the public shall receive a radiation dose exceeding the basic dose limit.

b. The administrative controls, as approved by DOE, shall include but not be limited to periodic monitoring, appropriate shielding, physical barriers to prevent access, and appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactivity or cause it to migrate.

c. The owner of the site or appropriate federal, state, or local authorities shall be responsible for enforcing the administrative controls.

E.3 Long-Term Management

Uranium, Thorium, and Their Decay Products

a. Control and stabilization features shall be designed to ensure, to the extent reasonably achievable, an effective life of 1,000 years and, in any case, at least 200 years.

b. Control and stabilization features shall be designed to ensure that Rn-222 emanation to the atmosphere from the waste shall not: (1) exceed an annual average release rate of 20 $pCi/m^2/s$, and (2) increase the annual average Rn-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L. Field verification of emanation rates is not required.

c. Prior to placement of any potentially biodegradable contaminated wastes in a long-term management facility, such wastes shall be properly conditioned to ensure that (1) the generation and escape of biogenic gases will not cause the requirement in paragraph b of this section (E.3) to be exceeded, and (2) biodegradation within the facility will not result in premature structural failure in violation of the requirements in paragraph a of this section (E.3).

d. Groundwater shall be protected in accordance with 40 CFR 192.20(a)(2) and 192.20(a)(3), as applicable to FUSRAP and remote SFMP sites.

e. Access to a site should be controlled and misuse of onsite material contaminated by residual radioactivity should be prevented through appropriate administrative controls and physical barriers--active and passive controls as described by the U.S. Environmental Protection Agency (1983--p. 595). These controls should be designed to be effective to the extent reasonable for at least 200 years. The federal government shall have title to the property.

Other Radionuclides

f. Long-term management of other radionuclides shall be in accordance with Chapters 2, 3, and 5 of DOE Order 5820.2, as applicable.

F. EXCEPTIONS

Exceptions to the requirement that authorized limits be set equal to the guidelines may be made on the basis of an analysis of site-specific aspects of a designated site that were not taken into account in deriving the guidelines. Exceptions require approvals as stated in Section D. Specific situations that warrant exceptions are:

a. Where remedial actions would pose a clear and present risk of injury to workers or members of the general public, notwithstanding reasonable measures to avoid or reduce risk.

b. Where remedial actions--even after all reasonable mitigative measures have been taken--would produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near affected sites, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

c. Where the cost of remedial actions for contaminated soil is unreasonably high relative to long-term benefits and where the residual radioactive materials do not pose a clear present or future risk after taking necessary control measures. The likelihood that buildings will be erected or that people will spend long periods of time at such a site should be considered in evaluating this risk. Remedial actions will generally not be necessary where only minor quantities of residual radioactive materials are involved or where residual radioactive materials occur in an inaccessible location at which site-specific factors limit their hazard and from which they are costly or difficult to remove. Examples are residual radioactive materials under hard-surface public roads and sidewalks, around public sewer lines, or in fence-post foundations. In order to invoke this exception, a site-specific analysis must be provided to establish that it would not cause an individual to receive a radiation dose in excess of the basic dose limits stated in Section B, and a statement specifying the residual radioactivity must be included in the appropriate state and local records.

d. Where the cost of cleanup of a contaminated building is clearly unreasonably high relative to the benefits. Factors that shall be included in this judgment are the anticipated period of occupancy, the incremental radiation level that would be effected by remedial action, the residual useful lifetime of the building, the potential for future construction at the site, and the applicability of remedial actions that would be less costly than removal of the residual radioactive materials. A statement specifying the residual radioactivity must be included in the appropriate state and local records.

e. Where there is no feasible remedial action.

G. SOURCES

Limit or Guideline	Source
Basic Dose Limits	
Dosimetry Model and Dose Limits	International Commission on Radiological Protection (1977, 1978)
Generic Guidelines for Residual Radioactivity	
Residual Concentrations of Radium and Thorium in Soil Material	40 CFR 192
Airborne Radon Decay Products	40 CFR 192
External Gamma Radiation	40 CFR 192
Surface Contamination	Adapted from U.S. Nuclear Regulatory Commission (1982)
Control of Radioactive Wastes and Residues	
Interim Storage	DOE Order 5480.1A
Long-Term Management	DOE Order 5480.1A; 40 CFR 192

H. REFERENCES

International Commission on Radiological Protection. 1977. Recommendations of the International Commission on Radiological Protection (Adopted January 17, 1977). ICRP Publication 26. Pergamon Press, Oxford. [As modified by "Statement from the 1978 Stockholm Meeting of the ICRP." Annals of the ICRP, Vol. 2, No. 1, 1978.]

International Commission on Radiological Protection. 1978. Limits for Intakes of Radionuclides by Workers. A Report of Committee 2 of the International Commission on Radiological Protection. Adopted by the Commission in July 1978. ICRP Publication 30. Part 1 (and Supplement), Part 2 (and Supplement), Part 3 (and Supplements A and B), and Index. Pergamon Press, Oxford.

U.S. Environmental Protection Agency. 1983. Standards for Remedial Actions at Inactive Uranium Processing Sites; Final Rule (40 CFR Part 192). Fed. Regist. 48(3):590-604 (January 5, 1983).

U.S. Department of Energy. 1984. Formerly Utilized Sites Remedial Action Program. Summary Protocol: Identification - Characterization - Designation - Remedial Action - Certification. Office of Nuclear Energy, Office of Terminal Waste Disposal and Remedial Action, Division of Remedial Action Projects. April 1984.

U.S. Department of Energy. 1985. Supplement to U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites. A Manual for Implementing Residual Radioactivity Guidelines. Prepared by Argonne National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest Laboratory for the U.S. Department of Energy. (In preparation.)

U.S. Nuclear Regulatory Commission. 1982. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material. Division of Fuel Cycle and Material Safety, Washington, DC. July 1982.

URANIUM SITE SPECIFIC SOIL GUIDELINES FOR THE U.S. ARMY RESERVE PROPERTY

developed by

T.L. Gilbert

Environmental Research Division
Argonne National Laboratory

Uranium site-specific soil guidelines where derived for the U.S. Army Reserve property adjacent to the Weldon Spring Chemical Plant. These derived soil guidelines (Gilbert 1986) are based on the requirement that the average annual committed effective dose equivalent to an individual should not exceed a basic dose limit of 100 mrem/yr above background (U.S. Dept. Energy 1985). Procedures specified in the DOE manual for implementing residual radioactivity guidelines were used to carry out the derivation (Gilbert et al. 1985).

It was calculated that the basic dose limit would not be exceeded if the average concentration of U-238 within contaminated zones does not exceed 60 pCi/g. This guideline value applies to the activity concentration of U-238 when no principal radionuclides other than U-238 and U-234 are present in above-background concentrations and when U-238 and U-234 are both present in secular equilibrium. In those locations, where other radionuclides are present in above-background concentrations, the mixture sum formula (Gilbert et al. 1985---Section 5.4.2) would be used to determine if guidelines are met.

For small, isolated areas on this property, soil concentrations of U-238 in excess of the above guideline levels are allowable, provided it can be established that the basic dose limit is not exceeded.

The foregoing guidelines are based solely on the requirement that the estimated potential dose to an onsite resident should not exceed 100 mrem/yr. An additional DOE requirement is that the radiation dose to individuals and groups should be kept as low as reasonably achievable (ALARA), economic and social factors being taken into account (Gilbert et al. 1985—Section 6).

REFERENCES

Gilbert, T.L. 1986. Derivation of Site-Specific Soil Guidelines for Weldon Spring Vicinity Properties - I. U.S. Army Reserve Property. Prepared by Environmental Research Division, Argonne National Laboratory, for Division of Facility and Site Decommissioning, U.S. Department of Energy. Draft Report, January 1986.

Gilbert, T.L., K.F. Eckerman, W.R. Hansen, J.W. Healy, W.E. Kennedy, Jr., B.A. Napier, and J.K. Soldat. 1985. A Manual for Implementing Residual Radioactivity Guidelines: A Supplement to U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites. Prepared by Argonne National Laboratory, Oak Ridge National Laboratory, Los Alamos National Laboratory, and Battelle Pacific Northwest Laboratory for the U.S. Department of Energy. September 1985.

U.S. Department of Energy. 1985. Guidelines for Residual Radioactivity at FUSRAP and Remote SFMP Sites (Revision 1, July 1985). Attachment to memo from J.E. Baublitz (Director, Division of Remedial Action Projects) to E.L. Keller (OR) and C.E. Miller (RL). (Reproduced in Appendix B of preceding reference.)

IRA-300-303

cc: D. R. Lewis
R. A. Nelson
A. J. Stewart

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

3589-87-I-EPA-010

NOV 5 1987

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Electric Power and Pole Removal,
- Overhead Piping/Asbestos Removal,
- Cleanup of Vicinity Property No. 7 on the Army Reserve Area, and
- Disposal of Containerized Chemicals.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

FILE NUMBER: ______

001812
11-6-87

We will provide any comments on these within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay
Regional Administrator

cc: Dr. Fred Brunner, MDNR

bc: Robert Morby
Dan Shiel
Rowena Michaels
Ron Ritter

4711

NOV 10 1987

CONCURRENCES
RTG SYMBOL PEER
INITIALS/SIG. J. Coyne
DATE 11/9/87
RTG SYMBOL CE-541
INITIALS/SIG. R. Nelso
DATE 11/9/87
RTG SYMBOL
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Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of October 8, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: D. Bedan, MDNR
E. Brown, FLW
w/enclosure

FILE NUMBER

FILE NUMBER: ______________

DOE F 1325.10
(7-79)

PEER:JCoyne:x41:mw:11/9/87 (c:IRACom.Ltr.)

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RESPONSES TO USEPA REVIEW COMMENTS
ON IRA PACKAGES

Cleanup of Vicinity Property No. 7, Army Reserve Area

Comment: The proposal to cleanup this vicinity property calls for excavating the contaminated area to a depth of six (6) inches or where the radium concentration is below 15 pCi/g and then backfilling with clean material. The EPA suggests that while its criteria for residual radium in soil is satisfied by this approach, that we consider removing additional soil to reduce the concentration to below 5 pCi/g. As the area is small, little additional excavation would be required.

Response: Subsequent to the preparation of the IRA package for Army Reserve Vicinity Property #7, the Deparment of Army requested that the area not be backfilled upon completion of the cleanup as proposed by the DOE. The DOE will leave the excavation area open and apply the suface criteria of 5 pCi/g to this particular vicinity property.

Disposal of Containerized Chemicals

Comment: It is suggested that the specifications for this work might be strengthened by adding waste characterization procedures into Section 2.0 (Scope) of the document. The procedures are those which may be required under 40 CFR 260-268, or others required by the permit held by the Treatment, Storage and/or Disposal Facility.

Response: Procedures required in 40 CFR 260-268 will be referenced in Section 2.0 of the Request for Proposal. In addition, it will be emphasized that all waste characterization procedures which are required by the successful bidder's treatment, storage and/or disposal facilities permit must be satisfied. It will be required that these procedures (if applicable) be presented in the subcontractor's work plan.

Comment: EPA recommends that the specific subcontractor qualifications and experience in handling known and unknown potentially hazardous wastes be defined in the document.

Response: We are in agreement with the EPA that the Request for Proposal should contain subcontractor qualifications and experience clauses. The appropriate clauses will be added to the document.

Comment: The EPA recommends that the specification require the successful bidder to identify the specific waste disposal facilities which will accept the containerized chemical waste, in the work plan phase.

Response: The specification will be modified to include provision for certification by the subcontractor that the waste disposal facilities meet the requirements when hazardous wastes are involved. The land disposal ban provision of RCRA will also be addressed as part of the subcontractor's work plan.

General

Comment: The EPA review states that there is one(1) deficiency common to the four proposals and that is that plans for onsite handling and storage of radioactive contaminated materials should be developed.

Response: Plans for onsite handling and storage of radioactive contaminated materials are currently being finalized and will be provided under separate cover.

4711

NOV 10 1987

Mr. David E. Bedan
Missouri Department of
Natural Resources
Post Office Box 176
Jefferson City, Missouri 65102

Dear Mr. Bedan:

MISSOURI DNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in Dr. Frederick A. Brunner's letter of October 26, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised and we intend to proceed with these actions in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: B. K. Biggs, USEPA
E. Brown, FLW
w/enclosure

FILE NUMBER:

PEER:JCoyne:x41:mw:11/9/87: (c:DNRCom.Ltr.)

CONCURRENCES	
RTG SYMBOL	PEER
INITIALS/SIG.	J. Coyne
DATE	11/9/87
RTG SYMBOL	CE-541
INITIALS/SIG.	R. Nelson
DATE	11/9/87
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(7-79)

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RESPONSES TO MDNR COMMENTS
ON INITIAL FOUR (4) IRA PROPOSAL PACKAGES

I. <u>Removal of Overhead Piping and Asbestos Removal</u>

Comment: The DNR states that Missouri has adopted the Federal Clean Air Act standards for asbestos handling and has been delegated responsibility for implementing these standards and that asbestos and piping removal activities are subject to both the Missouri Air Conservation Law and the Missouri Solid Waste Management Law. DNR recommends that we maintain close contact with the Air Pollution Control Program to insure compliance with these standards.

Response: DNR Air Pollution Control Program office will be kept apprised of plans for asbestos removal work at the Weldon Spring Site. The WSSRAP will comply with requirements for disposal of asbestos and other demolition wastes in accordance with the Missouri Solid Waste Management Act.

Comment: The DNR has determined that the overhead piping and asbestos should be handled as a "special waste".

Response: We are proceeding to include the Special Waste Disposal Request form in the Request for Proposal for this work.

Comment: The DNR states that onsite handling of asbestos and other demolition waste <u>may</u> also be subject to Missouri Solid Waste Management Law requirements and requests that we furnish information on the size, design, location of the staging area and the amounts and methods of handling for the materials to be handled in the materials staging area.

Response: Information on handling and staging of the materials will be furnished to the DNR prior to issuing requests for proposals for this work.

modnrrsp,txtsheil

II. Disposal of Containerized Chemicals

Comment: Define specific levels at which the containerized wastes are considered radioactive.

Response: WSSRAP is developing concentration levels for wastes containing natural uranium for review and acceptance by concerned federal agencies. We will advise the DNR of this determination as it comes available. Until this determination is made we will retain on site containerized chemical materials which contain detectable levels of radioactive materials as determined by our onsite instruments.

Comment: What are removal plans for underground storage tanks on site?

Response: The underground tanks at the WSS have been sampled and found to contain only rainwater with trace amounts of motor fuel. The drainage and removal of the underground tanks is not part of the containerized chemical inventory and removal IRA Scope of Work. They may be removed as part of a subsequent IRA.

Comment: The document appears to be a generic outline for removal of waste. Items such as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. are not detailed.

Response: The IRA documentation represents a request for proposal to be sent to potential removal subcontractors. The responsibility for developing a detailed work plan addressing such items as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. rests with the successful bidder. A requirement of the subcontract specification is the development of the subcontractor's work plan which must be approved by the WSSRAP before the work may begin. The DNR will be provided a copy of the subcontractor work plan when it becomes available for review. The WSSRAP office requests that the State provide a timely review (14 calendar days) to avoid delaying the subcontractor's

efforts. The State will be given 2-weeks notice of the interval at which time the work plan will be available for review.

III. Remedial Action on Army Vicinity Property

Comment: DNR states that the interim measure suggested is lacking in detail and should contain information on:

- How the removal is to be conducted?
- How and where excavated material will be contained?
- Health and safety plans for the work.
- Why is DOE recommending only remedial action for this vicinity property?
- When does DOE plan to remove the additional contamination in the other six locations?

Response: The technical requirements, i.e. specifications, drawings, special conditions, etc., did not accompany this IRA package for review as they were incomplete at the time of package submittal. Requirements for removal, containment and storage, and health and safety plans will be included in the Request for Proposal for this work.

The very small quantity (less than two cubic yards) of contaminated material can be removed manually and will not require any significant mechanical equipment. The technical specification developed for this work will provide required direction to the subcontractor.

We plan to excavate and place the contaminated soil in 55 gallon drums. The drums will be sealed, placed and stored in a dry, concrete floored building at the Weldon Spring Site awaiting final disposition. Total volume is anticipated to be less than 5 drums.

No unusual hazards are anticipated for this activity. The contract will require workers to abide by the WSSRAP Environmental, Safety and Health Plan.

DOE proposes performing remedial action of Army Vicinity Property No. 7 to remove contamination from an area where the Army has imminent construction plans. Cleanup of other vicinity properties, containing larger volumes of contaminated material, will be recommended based upon urgency of cleanup needs and development of storage facilities on the WSS.

Remediation of the remaining Army Vicinity Properties is tentatively scheduled for the first and second quarters of fiscal 1989.

IV. <u>Power Line/Pole Removal</u>

Response: The plan should address PCB contamination in regard to pole removal if transformers/capacitors containing PCB's were mounted on them.

Comment: The power poles to be removed in the IRA were specifically not associated with transformers containing PCBs. Those poles which have oil-cooled transformers mounted on them will be surveyed and removed at a later date.

IRA-300-304

Admin File 2 C-IDA4 - Corresp.

3589-87-I-DOE-176

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

August 25, 1987

M-K FERGUSON CO.
RECEIVED
OCT 20 1987
WSSRAP CONTRACT 3589

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

As we have discussed previously, the Department of the Army has requested the Weldon Spring Site Remedial Action Project to conduct remedial action on several vicinity properties in the Army Reserve training area adjacent to the Weldon Spring Site. These vicinity properties are areas of low level radiological contamination. Since the Army plans to do road construction in the training area beginning this fall, it is necessary that the contamination in the area of this activity be removed.

Enclosed is our plan for action on vicinity property #7 on the Army Reserve area. This is a very small area of contamination, consisting of a total of about 0.7 cubic yard of contaminated soil. Enclosure 01 to this letter is a copy of the report, Radiological Survey U.S. Army Reserve Property, Weldon Spring Site, St. Charles County, Missouri, prepared by Oak Ridge Associated Universities (ORAU) January 1986. This report defines the level and extent of the contamination of the vicinity properties on the Army Reserve area. Enclosure 02 is a copy of the DOE guidelines for residual radioactive material. The version contained in the ORAU report has been superceded. These documents will be applicable to future vicinity properties, so please retain them for reference.

Enclosure 03 is a recent radiological characterization performed by project personnel. A brief Action Description Memorandum containing the plan for action is contained in Attachment 04.

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The DOE will document the action in a memorandum setting forth the rationale for the action. A draft of such memo is Enclosure 05. The Action Description Memorandum will be attached to the memo. We would appreciate your prompt attention to this matter so that we may proceed with the remedial action and allow the Army Reserve to proceed with the construction work.

If there are any questions, please give me a call.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

CE-541:Nelson

Enclosures:
As stated

cc: Dave Bedan, MDNR w/enc.
Emily Brown, FLW wo/enc.

— Enclosure 01

RADIOLOGICAL SURVEY
U.S. ARMY RESERVE PROPERTY
WELDON SPRING SITE
ST. CHARLES COUNTY, MISSOURI

Prepared by

E. J. DEMING

Radiological Site Assessment Program
Manpower Education, Research, and Training
Oak Ridge Associated Universities
Oak Ridge, Tennessee 37831-0117

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A. S. Masvidal
L. L. Sowell**
C. F. Weaver
B. C. Williams

Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites - Remedial Action Program

FINAL REPORT

January 1986

This report is based on work performed under contract number DE-AC05-76OR00033 with the U.S. Department of Energy.

*Currently with EG&G Idaho, Idaho Falls, Idaho.
**Currently with IT Corporation, Knoxville, Tennessee.

FILE NUMBER: ______________

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LIST OF FIGURES

LIST OF TABLES

Enclosure 04

DESCRIPTION OF PROPOSED INTERIM REMEDIAL ACTION AT THE WELDON SPRING SITE

As part of its Surplus Facilities Management Program (SFMP), the U.S. Department of Energy (DOE) proposes to decontaminate a small area of contaminated soil on the U.S. Army Reserve Property located to the west of DOE's Weldon Spring site and transport the resultant wastes to the Weldon Spring site for interim storage. This action is being taken at the request of the U.S. Department of the Army, Fort Leonard Wood, to allow the Army to proceed with a road improvement project during the fall of 1987. The activities associated with the remedial action are:

- Removing about 0.4 m^3 (0.5 yd^3) of soil that is radioactively contaminated above current guidelines from Vicinity Property 7, which is located about 1 m (1 yd) north of Army Road No. 1 and 300 m (330 yd) west of a road intersection (see Figs. 1 and 2). The principal soil contaminants are radium-226 and thorium-230, with maximum concentrations of 215 pCi/g and 53 pCi/g, respectively.

- Placing the soil in appropriate containers (55-gal drums are currently planned) for ease of handling and for controlling the possible spread of radioactive contamination.

- Loading the containers on the back of a pickup truck.

- Transporting the material about 1.0 km (0.6 mi) through the Army Reserve Property to the Weldon Spring site (solely on Army- and DOE-owned land).

- Placing the contaminated material in the raffinate pits area at a controlled location for interim storage.

- Monitoring the environment during remedial actions to ensure compliance with all applicable radiation protection requirements.

DOCUMENT NUMBER: I-300-301-1.02

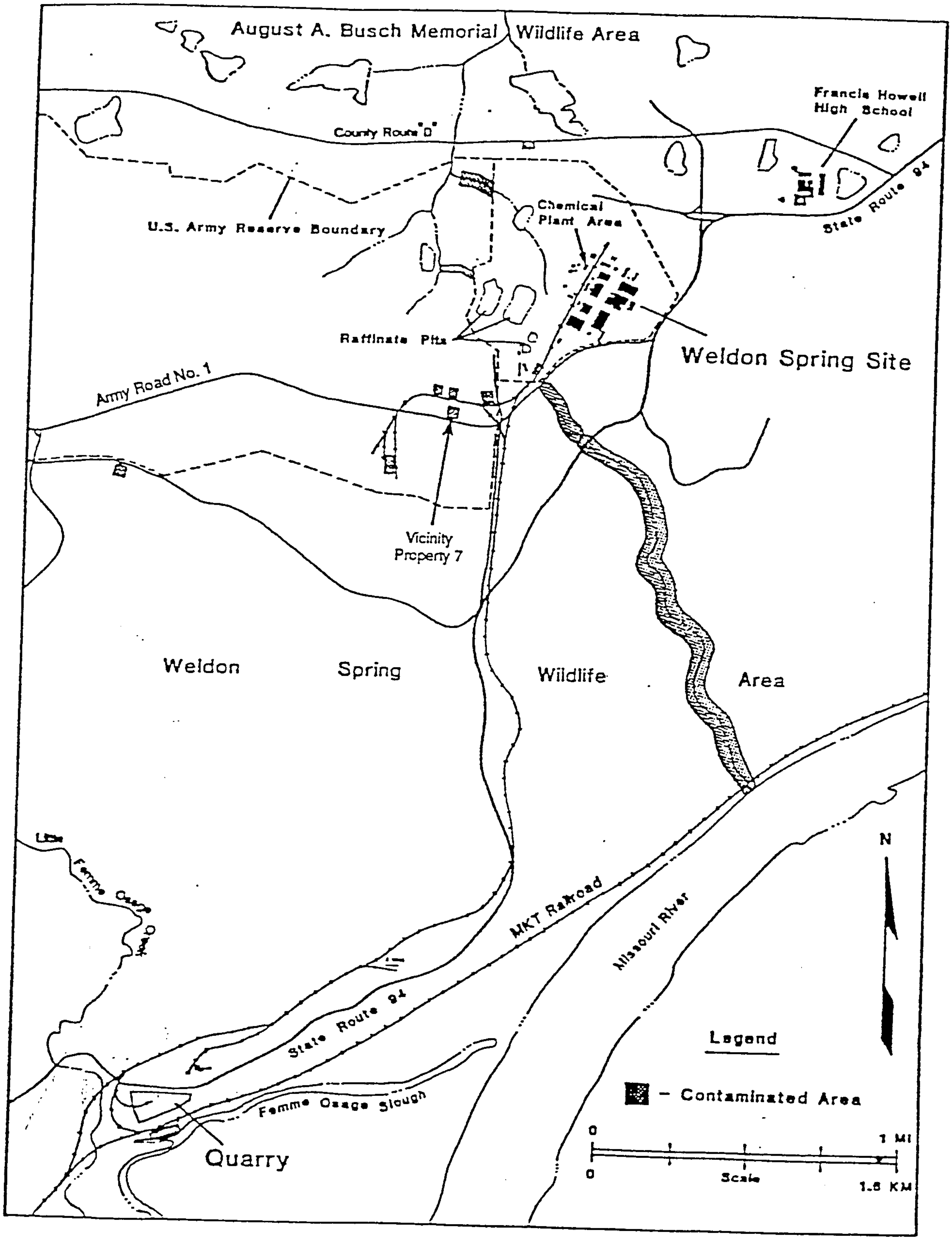


FIGURE 1 Location of Contaminated Vicinity Properties in the Area of the Raffinate Pits, Chemical Plant, and Quarry

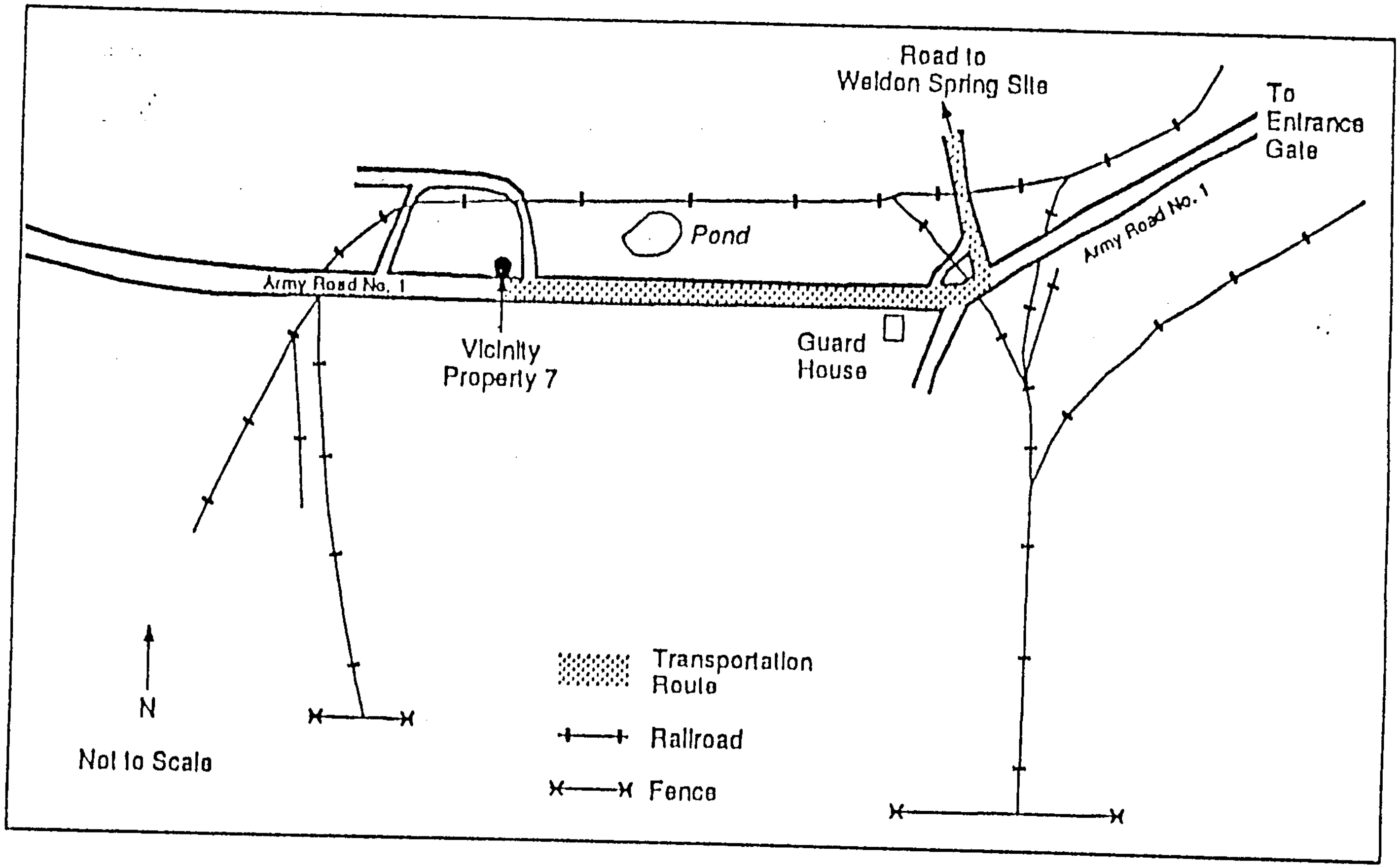


FIGURE 2 Location of Vicinity Property 7

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE ARFS FILE # IR-0400

TABLE OF CONTENTS

The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-400-401

SAMPLING OF INSULATION ON INTER-BUILDING OVERHEAD UTILITY PIPES FOR ASBESTOS CONTENT -- NOVEMBER 1986

Introduction

This plan describes the sampling effort to be conducted in November of 1986 for determining the amount of asbestos in insulation on pipes on overhead utilities at the WSCP.

Objective

This sampling effort will be performed to determine in a statistically valid manner whether insulation on individual sections of the inter-building overhead utility pipes at WSSRAP contain asbestos. The data collected in this sampling effort will be used by the Engineering Department in the preparation of bid specifications for the removal of the overhead inter-building utilities. Pipes in or on buildings will not be sampled during this sampling effort. The samples will be collected by the Environmental Safety and Health Department (ES&H).

Sampling Schedule

Samples will be collected on Monday and Tuesday November 17 and 18, 1986. Sampling may continue into the remainder of the week if necessary. Should differences in insulation composition be noted visually during the planned sampling effort, additional samples will be collected as necessary to further define the composition of the insulation.

Sampling Locations

Sampling locations have been selected to obtain samples from each

FILE NUMBER: ______________

size and type of pipe. The rationale for selection of the sampling locations is based on a review of existing WSCP construction blue prints and a site survey of the WSCP facilities conducted on November 7, 1986. Construction drawings numbered 7500-5 to 7500-28 prepared by Blaw-Knox Company in 1955 and 1956 shown locations of the pipes and the pipe support numbers for these overhead utilities. Samples will be collected from each size and type of pipe (steam, ethylene glycol, raffinate, etc.) and type of insulation. Insulation will be sampled in straight sections and at joints in the pipe. The sampling locations are described in Table 1. Figure 1 shows the planned sampling locations. These sampling locations have been selected to maximize the number of samples which can be collected at each point where the manlift will be positioned.

Equipment

The following equipment will be available for use during sample collection.

Item	Usage
Knife	Cutting Insulation and Sheathing
Cork Borer	Cutting Insulation
Hack Saw	Cutting Sheathing
Screwdriver	Sheathing Removal
Hammer	Bending Metal Sheathing
Sample Bottles	Sample Shipping
Ziploc Bags	Sample Shipping
Water Sprayer	Tool Cleaning and Dust Control
Bucket of Water	Tool Cleaning
Duct Tape	Dust Control
Camera	Documentation of Sampling Location
Sample Labels	Documentation of Sampling Location
Field Data Sheets	Documentation of Sampling Location
Clipboard	Documentation of Sampling Location
Paint	Documentation of Sampling Location

Flagging Tape	Documentation of Sampling Location
Tape Measure	Documentation of Sampling Location
Respirator with HEPA Filters	Personal Protection
Disposable Coveralls	Personal Protection
Rubber Gloves	Personal Protection
Rubber Boots	Personal Protection
Safety Glasses	Personal Protection
Hard Hat	Personal Protection
Eye Wash	Personal Protection
Radiation Monitoring Equip.	Personal Protection
Carrying Case	Transportation of Equipment
Manlift	Access to Sampling Location

Training

Personnel involved in collection of asbestos samples shall receive training in the health and safety aspects of asbestos. They shall also be trained in the operation of any special equipment (i.e. hydraulic manlifts).

Sample Collection

Prior to collecting samples, a safety meeting will be conducted to familiarize personnel with equipment and procedures. A respirator is recommended, but is not required as sampling will not generate airborne concentrations above allowable levels. Once the sampling location is verified and access is established, samples will be collected as follows:

1. Start a field data sheet for the sample to be collected. Record the date, time, location, pipe type if known, pipe size, and any other relevant information on the field data sheet. An example field data sheet is presented in Figure 2.

2. Select two corresponding pre-labeled sample bottles for the sample to be collected at that location. Example labels are shown in Figure 3.

3. Open the sheathing using a knife, hack saw or screwdriver as

appropriate.

4. If the sheathing is not metal, place pieces of the removed sheathing in the sample containers.

5. Loosen a piece of insulation using a cork borer, knife, or other appropriate tool.

6. Split the piece of insulation in half. Ensure that both halves contain a complete cross section of the insulation.

7. Place the pieces of insulation in the sample bottles.

7. Close the sample bottle.

8. Complete and sign the field data sheet.

Radiation Monitoring

A member of the Health Physics Group shall measure the radiation levels of the individual samples prior to shipment of the samples off site. Sample collection personnel shall use radiation measurement equipment calibrated by the Health Physics Group to monitor levels in the work area during sample collection.

Chain of Custody

All samples will be kept in the custody of the sample collection personnel from the time of collection shipment. A chain of custody log sheet which lists each sample will be completed and signed by the sample collection personnel. The original of the chain of custody log sheet will be shipped with the samples to the laboratory. A copy of the chain of custody will be retained at WSSRAP by the ES&H Department. An example chain of custody form is presented in Figure 4.

SAMPLING OF INSULATION ON INTER-BUILDING OVERHEAD UTILITY PIPES FOR ASBESTOS CONTENT -- NOVEMBER 1986

Sample Analysis

Samples will be analyzed by polarized light microscopy. The selected laboratory shall be a participant in the EPA laboratory evaluation program.

Quality Control

Sample collection will be observed on a random basis by a representative of the WSSRAP ES&H Department. One in twenty of the split samples will be submitted for analysis. The remainder of the splits will be archived at the WSSRAP facility for verification by a separate laboratory if necessary. Once QC checks of the lab data are complete, the archived samples will be used in training WSSRAP personnel and subcontractors for future asbestos removal activities.

Reporting of Visual Observations

The sample collection crew will discuss with the Engineering Department observations regarding visible differences and/or similarities of the insulation at the various sampling locations.

Reporting of Analytical Results

The laboratory will report the concentration of asbestos in the sample. The lab data, field data and drawings showing the sampling locations will be incorporated in a final report by ES&H for submittal to the Engineering Department. This report will be completed within 7 days of receipt of the lab data.

SAMPLING OF INSULATION ON INTER-BUILDING OVERHEAD UTILITY PIPES FOR ASBESTOS CONTENT -- NOVEMBER 1986

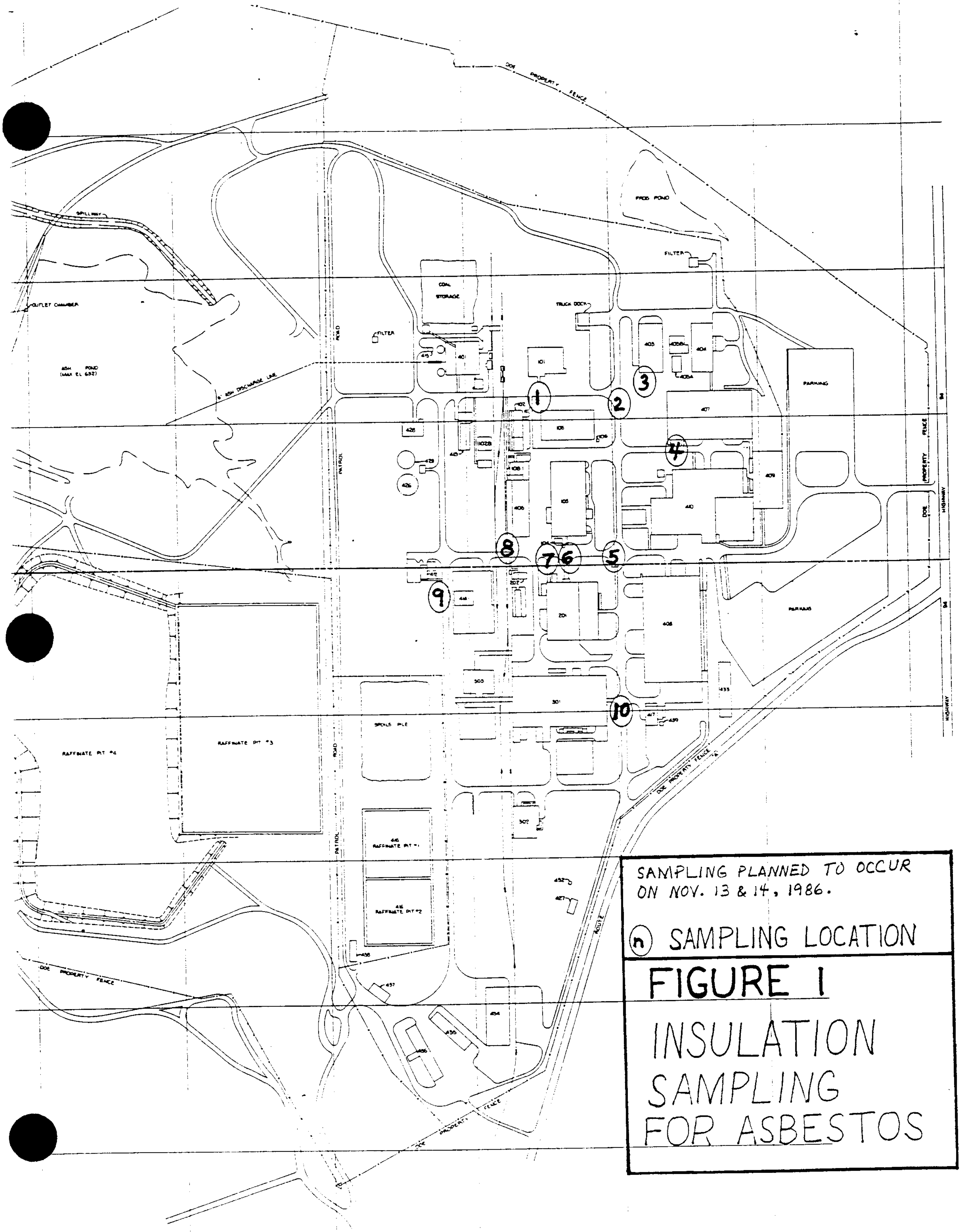


FIGURE 1

INSULATION SAMPLING FOR ASBESTOS

FIGURE 2

EXAMPLE FIELD DATA SHEET

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)

Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: ______________________ Date: ______________________

SAMPLING LOCATION

Building Number ________
Floor ________
Room ________
Construction Drawing ______________
Other ______________________

MATERIAL TYPE

_____ Pipe Insulation
Pipe Diameter: _________ inches
Pipe Type: _____ Steam, _____ Ethylene Glycol, _____ Raffinate,
_____ Other ______________________
_____ Ceiling
_____ Floor
_____ Wall
_____ Boiler Insulation
_____ Other ______________________

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ______________________

DESCRIPTION OF MATERIAL

Color: ______________
Hardness: ____ Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)
Thickness: ________ inches

COMMENTS ______________________
____
____

Radiation Level
_____ Background Only
_____ Above Background ________ cpm Instrument: ______________

Sample Collection Personnel: ______________________ Company: ______________

FIGURE 3

EXAMPLE SAMPLE LABEL

Weldon Spring Site Remedial Action Project (WSSRAP)
MK-FERGUSON COMPANY (PMC)
Rt. 2, Hwy 94, St. Charles, MO 63303
Phone (314) 441-8086

Sample Number IN-2000- 1

Location: WSCP (Pipe Support No.:______________)
Matrix: Pipe Insulation - Above Ground Utilities
Collected By: Kirk Meyer
Date: November _____ 1986

Table 1 -- Asbestos Sampling Locations, WSSRAP, Nov. 17-18, 1986
PLANNED

Location Number	Support Number	Description (Drawing No)	Insulation Samples To Be Collected Quant.	Pipe Type	Sheath	Size
1	508	NW Corner of Building 105 (7500-16)	1	Steam	Fiber	18 inches
			1	Steam	Fiber	10
			2	Ethylene Glycol	Fiber	6
			2	Unknown	Fiber	?
			1	Elbow (Steam)	Fiber	18
			1	Elbow (Steam)	Fiber	10
2	522	NE Corner of Building 105 (7500-17)	1	Steam	Fiber	8
			2	Ethylene Glycol	Fiber	6
			1	Unknown	Fiber	4
			1	Unknown	Fiber	2
			1	Unknown	Fiber	2
			1	Unknown	Fiber	1
3	71	NW Corner of Building 403 (7500-23)	1	Steam	Fiber	6
			2	Ethylene Glycol	Fiber	2
			1	D. S.	Fiber	2
			1	Steam	Fiber	8
			1	Unknown	Fiber	2
			1	Unknown	Fiber	2
4	731	From Building 407 to 410 (7500-28)	2	Ethylene Glycol	Fiber	4
			1	Unknown	Fiber	2
5	40	NE Corner of Building 201 (7500-19)	1	Steam	Fiber	18
			1	Raffinate	Fiber	3
			1	Elbow	Fiber	3
			1	Raffinate	Metal	3
			1	Elbow	Metal	3
6	562	North Center Building 201 (7500-24)	1	Steam	Fiber	6
			1	Raffinate	Fiber	3
			1	Raffinate	Metal	3
7	564	NE Corner of Building 201 (7500-24)	1	Raffinate	Unknown	3
8	Ground	SW Corner of Building 406 (N. A.)	1	Steam?	Fiber	1
9	764	West of Building 406 (7500-25)	1	Raffinate	Fiber	3
			1	Elbow	Fiber	3
			1	Raffinate	Metal	3
			1	Elbow	Metal	3
10	84	East Center Building 301 (7500-20)	1	Steam	Fiber	10
			1	Steam	Fiber	3
			1	Elbow (Steam)	Fiber	1
Total			42			

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)

Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

ENVIRONMENTAL PROTECTION GROUP -- DOCUMENT REVIEW

Plan Title: PLAN FOR SAMPLING OF INSULATION ON INTER-BUILDING OVERHEAD UTILITY PIPES FOR ASBESTOS CONTENT — NOVEMBER 1986

Date Prepared: NOVEMBER 13, 1986 Author: KIRK MEYER Kirk Meyer

Draft Number: 2

Purpose of Transmittal:

____	For Approval	____	For Review and Comment
____	For Your Information	____	Review and Correct
____	As Requested	____	Review and File
____	Return of Loan to Us	____	Returned for Corrections
____	Other ____________		

~~To Be~~ Reviewed By:

Title	~~Signature~~ Name	Date
Others	N. Ed. Hodson	NOV. 12, 1986
	Yusuf G. Nazrani	NOV. 12, 1986
Environmental Manager	F. Keith Nowadly	NOV. 12, 1986
E S & H Manager	Roger A. Nelson	NOV. 12, 1986
Quality Manager		
Engineering Manager		
Project Manager		

IRA-400-402

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

September 03, 1987

Ms. Katherine Biggs
United States Environmental
Protection Agency, Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

Enclosed is the information regarding the removal of overhead yard piping and asbestos insulation from the Weldon Spring Site, which we agreed upon in our telephone conference on July 24, 1987.

The site contains insulated overhead piping in the yard areas. The insulation is deteriorating and falling to the ground. The material is subject to blowing about and presents a potential hazard to exposed personnel. We propose to remove the material.

Radiologically contaminated material will be retained on site in a secure condition. Non-radiologcally contaminated materials will be disposed of offsite in approved landfills.

The entire task involves removing about 33,000 linear feet of pipe, 13,00 of which is asbestos insulated, and 500 pipe supports. The work will be accomplished by a subcontractor to MK-Ferguson Company, our Project Management Contractor.

The enclosed index lists five (5) attachments including sampling data and plans and specifications for the work. If you have any questions, please contact Jim Coyne of PEER Consultants, our support services contractor at (314) 441-8472.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR

FILE NUMBER: ____________

INTERIM MEASURE

OVERHEAD PIPING/ASBESTOS REMOVAL

SUMMARY

This task consists of removing all abandoned outside overhead yard piping and associated insulation and pipe supports at the Weldon Spring Site. Approximately 33,000 lf of pipe are involved, 13,000 lf of which is asbestos insulated pipe. About 500 structural steel pipe support columns and a number of bridging structures are also included in this task.

The asbestos containing material (ACM) is deteriorating and falling to the ground. It is accessible to the elements and subject to blowing about the site. Its presence and state of deterioration constitute a significant threat to the health and safety of on-site workers and could under dry, high wind conditions pose a threat to off-site personnel.

We propose this work to place the ACM under control and mitigate worker and public exposure to the hazard posed by the deteriorating pipe insulation.

The plan calls for removal, survey, segregation, and protection of materials in on-site staging areas. Radiologically contaminated ACM will be retained on-site. Non-radiologically contaminated materials will be released for disposal off-site in approved asbestos landfills. We expect much of the utility pipe, structural supports, and asbestos to be releasable for disposal off-site.

3589-SC-WP017

TECHNICAL SPECIFICATIONS

WSSRAP OVERHEAD PIPING REMOVAL

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

LIST OF TECHNICAL SPECIFICATIONS
3589-SC-WP017

Specification Section No.		Title
1)	Section 02051	Demolition Of Overhead Piping And Supports
2)	Section 02080	Asbestos Removal On Overhead Piping

WSSRA PROJECT REVIEWS AND APPROVALS

Subject: WSSRA PROJECT - CP
Specification Section 02051
Demolition of Overhead Piping
and Supports

5121-C:SP-S-01-0192-02
(DOCUMENT NO.)

	Signature	Date
Prepared:	J Eaney	5-19-87
Reviewed:	DW Reppond	5-19-87
Approved, MKE:		
- Site Design Engineer	KDW Reppond	5-19-87
- Engineering & Design Manager	Philip R Thuener	5-19-87
- Chief Engineer, ESC Division	J.L. Jordan	22 May 87

QA Compliance Pdc 5-22-87

- PMC Engineering Manager DL Lewis 6-17-87

Q.A. REVIEW
ENTRY NO. N/A
INIT. JH DATE 6/18/87

PART 1 - GENERAL

1.1 SCOPE

A. This Specification Section describes the . the demolition and placing into storage o facilities:

1. All outdoor above ground piping, pipe pipe bridges at a uranium feed mate plant, including steel piping (insul sulated), steel support structures and extending up to building lines. Also moval of some piping which is polyvinyl pipe and some timber pole, pipe suppo ping of asbestos contaminated soil. (was primarily for supplying plant uti natural gas, plant air, steam, ethyle water. Piping to raffinate pits and st generally insulated with asbestos contai.

2. Asbestos containing insulation on thre haust flue ducts to chimney stacks on steam plant, Building No. 401. Re contaminated soil to 5 feet horizontal of flue duct.

3. Asbestos-insulated pipe section with st frame support (approximately 50 feet lo ground beside road east of Building No topsoil within 5 feet of each end of pipe

4. Sections of asbestos insulated pipin ground about 60 feet north of Raffinate proximately 79 joints at 30 ft. long equ Strip topsoil within 5 feet of stacked pi

B. Locations of demolition and material stag shown on project drawings.

C. Refer to Special Conditions, Articles SC-9 a restrictions applicable to working in areas w radiation hazards.

D. Refer to Section 02080 for requirements applicable to removal, handling, and clean-up of asbestos-containing materials.

1.2 WORK NOT INCLUDED

Foundations and underground structures are excluded.

1.3 SUBMITTALS

A. Dismantling and Asbestos Containment Plan:

The Subcontractor shall submit a detailed plan of the work schedule and procedures to be used in dismantling the overhead piping and supports. The plan shall include details concerning sequencing, method for asbestos containment during pipe cutting, and removal methods for support removal, air monitoring, transportation and storage. The Subcontractor shall meet with the Contractor prior to beginning work to discuss and obtain acceptance of the Plan. 2

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 DEMOLITION

A. Pollution Controls:

1. Water sprinkling and temporary enclosures shall be used to limit the amount of airborne dust and dirt to the lowest practical level. Other methods of limiting the amount of airborne dust and dirt must be approved by Contractor.

2. Water shall not be used if it is likely to create hazardous or objectionable conditions such as ice, flooding, or pollution. An approved water-based biodegradable wetting agent (surfactant) may be used to reduce the quantity of water required.

B. Cutting and Capping:

1. Pipes shall be cut as close as practicable to the ground level and the faces of buildings.

2. Pipe supports shall be disconnected from their concrete footings where possible; otherwise they shall be cut off as close to the footing as possible. Footings shall be left in place.

C. Holes due to removal of timber poles shall be backfilled.

D. Areas disturbed by demolition operations, including backfilling and soil stripping, shall be seeded as specified in Section 02930.

3.2 DISPOSAL OF DEMOLITION DEBRIS

A. All materials shall be transported to and stacked at the on-site material staging area.

B. Within the staging area, materials shall be stacked in separate areas as directed by the Contractor. Materials shall be segregated into stacks of similar shapes.

C. Before placement in the material staging area, all materials shall be cut or broken up in sizes not greater than 10 feet in any dimension and not greater than 27 cubic feet in volume.

D. Unless otherwise approved by the Contractor, the demolition debris shall be stored in layers or piles not to exceed 10 feet in height.

E. All piping is considered empty except for short runs which may contain small amounts of liquids. For piping known to have contained ethylene glycol or piping suspected to contain 'unknown' liquids, Subcontractor shall provide drum containers for collecting liquids without liquids contacting ground surface.

END OF SECTION 02051

WSSRA PROJECT REVIEWS AND APPROVALS

Subject: WSSRA PROJECT - CP
Specification Section 02080
Asbestos Removal on Overhead
Piping

5121-C:SP-S-01-0122-03
(DOCUMENT NO.)

	Signature	Date
Prepared:	J. Eimers	5-29-87
Reviewed:	D. Rippond	5-29-87
Approved, MKE:		
- Site Design Engineer	D. Rippond	5-29-87
- Engineering & Design Manager	Philip D. Thnener	5-29-87
- Chief Engineer, ESC Division	E. B. Smith	29. V. 87

QA Compliance Pdc 5-29-87

- PMC Engineering Manager — DK Lewis 6/17/87

Q.A. REVIEW
ENTRY NO. N/A
INIT. DATE 7/22/87

SECTION 02080

ASBESTOS REMOVAL ON OVERHEAD PIPING

PART 1 - GENERAL

1.1 SCOPE

A. This Specification Section describes the requirements for removal and disposal of asbestos-containing material on outdoor aboveground utility and process piping and valves between buildings at the Chemical Plant Site. All steam pipe insulation contains asbestos. Ethylene glycol piping insulation contains asbestos at bends only. Pipe is to be removed with insulation intact where possible. Clean-up of some asbestos contaminated soil is included.

B. The Subcontractor shall furnish all labor, supervision, materials, services, insurance, and equipment necessary to carry out the removal operation in accordance with the EPA and OSHA regulations and the State of Missouri Department of Natural Resources.

C. The Subcontractor shall be responsible for disposal of all asbestos containing materials at a designated location shown on the Subcontract Drawings.

D. The requirements specified in this Section are supplemental to the requirements specified in General Provisions, General Conditions and Special Conditions.

1.2 CODES AND REGULATIONS

A. All work on this Subcontract shall comply with applicable codes and regulations including, but not limited to, the following:

1. U.S. Department of Labor, Occupational Safety and Health Administration ("OSHA"): 29CFR1926.58

2. Environmental Protection Agency ("EPA"):

   National Emmissions Standard for Hazardous Air Pollutants (NESHAPS) 40CFR61, Subparts A and M

B. Posting Regulations: Copies of applicable OSHA and EPA regulations shall be obtained by the Subcontractor. One copy of each shall be posted at the job site. The EPA notification of asbestos removal, including the "Plan of procedures to be employed for compliance with EPA regulations" shall also be posted at the job site.

1.3 DEFINITIONS

A. Asbestos Controlled Area: The asbestos contaminated work area or any other area with either an airborne asbestos level equal to or above 0.01 fiber/cc air or visible uncontained deposits of asbestos-contaminated material.

B. Asbestos-Containing Material: Materials either containing more than 1% by weight of asbestos, excluding substrate materials, or contaminated with asbestos to a degree that handling the materials may reasonably be expected to give rise to exposure to airborne asbestos fibers.

C. Contaminated Materials: Materials having radioactive contamination levels greater than specified in the applicable US Environmental Protection Agency Standards. These standards are presented in the Federal Register, January 5, 1983, Section 192.12: "Standards for Remedial Actions at Inactive Uranium Processing Sites". The contamination levels will be determined by the Contractor.

D. HEPA Filter: A High Efficiency Particulate Absolute filter capable of trapping and retaining 99.97% of particles with aerodynamic equivalent diameters greater than or equal to 0.3 micrometer.

E. Clearance Air Samples: Air samples taken following asbestos removal and visual inspection by the Contractor or his authorized representative to verify completion of work specified under this Subcontract.

F. Amended Water: Water to which a surfactant has been added.

G. Encapsulant: A liquid material which can be applied to asbestos material which controls the possible release of asbestos fibers from the material by penetrating into the material and by binding its components together.

1.4 NOTIFICATION REQUIREMENTS

At least 20 days prior to beginning work on the asbestos-containing materials and 20 days prior to completion of Work on this Subcontract, the Subcontractor shall submit written notifications to the State of Missouri Department of Natural Resources. The specific information shall be provided as detailed in 40CFR61.146, Subpart M. The notice shall be sent to: 3

Department of Natural Resources
Division of Environmental Quality
P. O. Box 176
Jefferson City, Missouri 65102

Attn: Bob Craig (314-751-8328)

1.5 EXPOSURE MONITORING

A. The airborne asbestos exposure limit outside of asbestos controlled areas is 0.01 fiber/cc air. Where control of airborne asbestos levels to below 0.01 fiber/cc air is impractical, temporary asbestos control areas shall be established. Asbestos removal work areas with higher concentrations, or where concentrations might reasonably be expected to exceed the allowable limit, must be separated from other work areas by air-tight barriers. Airtight barriers for piping shall generally consist of glove bag or glove box.

B. All air monitoring shall be performed under the supervision of the Subcontractor's industrial hygienist, who must be certified by the American Board of Industrial Hygiene.

C. Documentation of each air sample shall be as specified by the Contractor and shall include at least the date and time, sample number, exact sampling location, name of individual performing sampling, sampling rate, sampling volume, analytical method, analytical results and limits of quantification and detection per National Institute of Occupational Safety and Health (NIOSH) analytical methods.

D. Analysis of air samples shall be as specified in 29 CFR 1926.58 Appendix A or equivalent. Samples shall be analyzed onsite. Test results of samples taken outside of asbestos control areas and one sample per work shift from each asbestos control area shall be reported to the Contractor within 4 hours of collection. Samples exceeding the asbestos exposure limit shall be reported to the Contractor immediately following the analysis. The analysis quality assurance program shall include recounting of a portion of the samples by a laboratory accredited by the American Industrial Hygiene Association (AIHA) for asbestos analysis and currently judged proficient in asbestos counting by successful particpation in the NIOSH Proficiency Analytical Testing (PAT) program. The portion of samples recounted shall include the following: (1) all clearance air samples, (2) all samples taken outside asbestos control areas exceeding the exposure limit, and (3) 10% of the remaining samples taken from both inside and outside asbestos control areas not exceeding the exposure limit. All quality assurance sample results shall be reported to the Contractor within two weeks of collection.

E. Preliminary air sampling shall be sufficient to establish the perimeters of asbestos control areas to the satisfaction of the Contractor.

F. Air samples shall be taken in the breathing zones of workers removing asbestos in sufficient numbers to permit selection of appropriate respirators and Time Weighted Average (TWA) Exposures. At a minimum, for TWA exposures, one personal sample on the worker with the highest probable exposure is required in each asbestos control area, per work shift.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wetting Materials: For wetting asbestos-containing materials prior to disturbance, amended water or a removal encapsulant shall be used. Wetting materials shall be tested at the job site on the material to be removed to ensure that the use of the material will result in the thorough wetting of the asbestos containing material and retardation of fiber release during disturbance of the material. Testing of wetting materials shall be done to the satisfaction of the Contractor.

B. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mils thick, clear or opaque.

C. Polyethylene Tubing: Seamless tubing of a single polyethylene film, 6 mil (minimum) thickness, and of a diameter sufficient to enclose one or more insulated pipes.

D. Disposal Bags: Six mil (minimum) thickess leak-tight polyethylene bags shall be provided by the Subcontractor. Bags shall be labeled in accordance with EPA and OSHA regulations.

E. Glove Bags: Six mil (minimum) thickness polyethylene glove bags.

PART 3 - EXECUTION

3.1 ESTIMATED AMOUNTS OF ASBESTOS-CONTAINING MATERIALS TO BE REMOVED

The estimated amount of friable asbestos is approximately one hundred eighty-five (185) cubic yards on 11600 feet of pipe and 6 cubic yards on flue ducts. This asbestos is in piping insulation material located from ground level to a height of approximately 50 feet on various exterior pipe racks between the various structures, to the limits of the building faces, including vertical risers.

3.2 REMOVAL METHOD OPTIONS AND EXECUTION

A. Removal of Asbestos-Contaminated Soil:

1. Soil shall be saturated with amended water or removal encapsulant. The surface of the soil shall be kept continuously wet throughout its removal and decontamination. Areas designated on plan drawings, where asbestos insulation has fallen to ground, shall have the top soil stripped.

2. The limits of stripping under piperacks and pipeways shall include that area directly under the pipeway bounded by the outermost dimensions of the included pipe support plus 5 feet beyond. The top 3 inches of soils shall be removed and placed in disposal bags along with any visible asbestos. The limits of stripping for other designated items is the area immediately below and within 5 feet horizontally.

3. Personnel protective equipment shall be worn during initial soil decontamination activities. Traffic shall not be permitted onto the fresh soil surface. After the entire first layer of soil is removed, coveralls and boot covers shall be completely changed. Decontaminate excavation equipment by washing with water. Collect all water and filter as specified in 3.2.G. The remaining asbestos removal and decontamination work shall be carried out as specified.

B. Piping shall be removed in units or sections with insulation in place. The maximum allowable unit size is ten (10) linear feet.

C. Completely seal straight runs of piping between supporting columns with polyethylene sheeting or tubing. Duct tape shall be used to seal edges and spiral stripe wrap surface as reinforcement. Areas where asbestos is to be removed from the piping prior to dismantling and cutting, or areas where insulation and pipe are to be cut simultaneously, shall be enclosed in a glove bag or glove box. Glove boxes, if designed for multiple use, shall be decontaminated prior to being moved.

D. Isolation of Work Area: Areas where asbestos-containing material is to be removed, disengaged from pipe racks, or disturbed in any way shall be isolated and enclosed with glove bags or glove boxes. If glove boxes are to be used, construction details of the temporary enclosures shall be submitted as part of the Asbestos Removal Plan. The glove box shall be maintained under minimum negative operating pressure of at least 0.02 inch of water.

E. When glove boxes are inadequate, areas where asbestos-containing material is to be removed, in any way, shall be isolated and enclosed in temporary enclosures maintained under a minimum negative pressure of 0.02 inch of water. The minimum enclosure shall have a solid floor; walls shall be framed with wood or metal. The interior surface of the walls, ceiling and floor shall be covered with two layers of polyethylene sheeting such that the inner layer can be removed without disturbing the integrity of the outer layer. The sequence of applying polyethylene sheeting to the inner surfaces, overlaps, sealing procedure and decontamination facilities shall be as described in 29 CFR 1926.58 Appendix F. Decontamination facilities shall be of adequate number and size to allow effective decontamination of both workers and equipment.

F. Maintenance of the Enclosure System: Damage and defects in the enclosure system shall be repaired immediately upon discovery. If at any time during the project after removal work has started, visible debris or elevated levels of asbestos in air are observed outside the enclosure or if damage occurs to barriers, work shall immediately stop, the Contractor shall be notified, and repairs shall be made to the enclosure and debris cleaned up as specified in Paragraph A above.

G. Wastewater Collection: All wastewater shall be collected and filtered through a dual filtration system. Provide a first filter that removes all fibers 20 microns or longer and a second filter that removes all fibers 5 microns or longer. The filtered wastewater shall be collected, transported, and discharged at a location near Raffinate Pit No. 4 where directed by Contractor.

H. Where piping is cut at building lines, the exposed cut ends of asbestos containing insulation which will remain shall be sealed in polethylene secured by duct tape.

3.3 COMMENCEMENT OF REMOVAL WORK

A. Removal work shall not commence until:

1. After first enclosure system (glove bag and glove box), which shall be typical for all subsequent work, has been constructed (with glove box, also, brought under negative pressure), Subcontractor shall notify Contractor that the enclosure is available for inspection. Subcontractor shall receive written approval from Contractor to proceed with asbestos removal for glove bag and, separately, for glove box.

2. All submissions, notifications, postings and permits have been provided and approved by the Contractor.

3. All equipment is on hand.

4. All worker training and certification is completed.

3.4 TRANSPORT AND STORAGE

A. All materials removed shall be transported to and placed in the on-site Material Staging Area shown on the Subcontract Drawings. The area shall be distinguished by installing flags, or by boundary markers approved by the contractor, to prevent disturbance of the area by other subcontractors. The flags or markers shall be installed at each corner of the area and at a spacing not exceeding 40 feet.

B. The Subcontractor shall comply with EPA air emissions regulations, 40CFR61.152 and 40CFR61.153 during all transport and handling operations.

C. All bags containing asbestos shall be labeled in accordance with EPA and OSHA regulations.

D. All bags shall be placed in "fiberdrums" and covered with polyethylene film at material staging area.

3.5 CLEANING WORK AREAS AFTER ASBESTOS REMOVAL

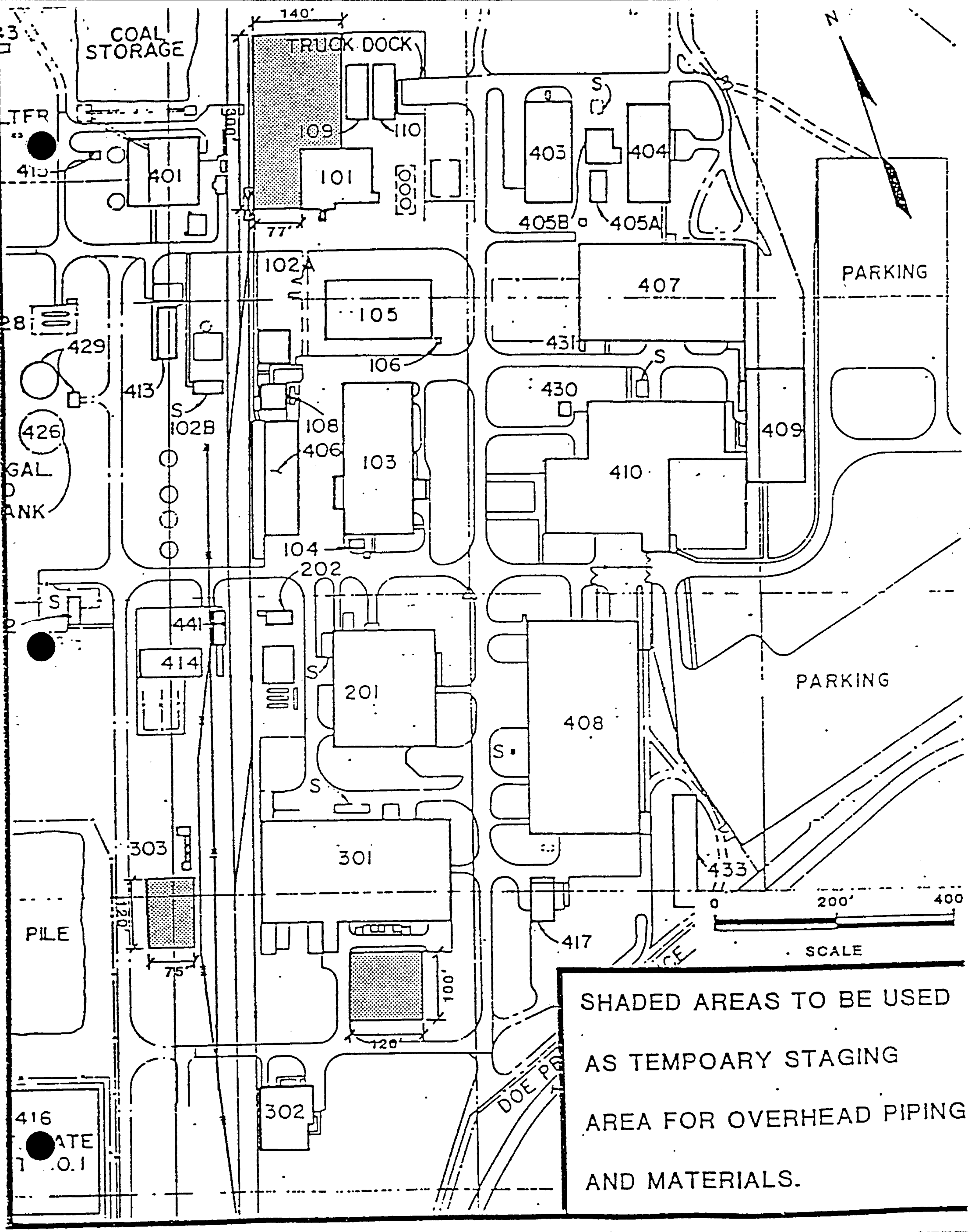
A. Prior to removal of enclosures, work areas shall be cleaned to assure there are no asbestos fibers which could become airborne.

B. Construction equipment shall be cleaned and free of asbestos fibers before removal from site-controlled work areas.

C. The Subcontractor shall notify the Contractor when work is complete for a final visual inspection.

D. After Contractor's final visual inspection, the enclosure shall be removed and all asbestos containing waste disposed of per the above.

END OF SECTION 02080



Drawing WP017-A

Weldon Spring Site Remedial Action Project (WSSRAP)
Route 2, Highway 94 South, St. Charles, Missouri 63303
Phone (314) 441-8086 Telecopy (314) 447-0803

FINAL

Asbestos Content of Pipe Insulation On Outdoor Overhead Utilities At The WSCP

Prepared for:

U.S. Department of Energy
Weldon Spring, Missouri

Prepared by:

Weldon Spring Site Remedial Action Project
MK-Ferguson Company -- Project Management Contractor
Weldon Spring, Missouri

ES&H
Kirk Meyer
February 3, 1987

MKF Project No. 3589

TABLE OF CONTENTS

1.0 INTRODUCTION

This report presents the results of a survey to determine the type of insulation on overhead utilities at the Weldon Spring Chemical Plant (WSCP). In particular, this survey determined which pipes were insulated with asbestos containing material as defined by the EPA (greater than 1 percent asbestos by volume). Results of this survey are intended to be used in the preparation of an engineering plan for removal of the overhead utilities from the site. This report does not include a determination of the actual quantity of asbestos insulation, rather only the types of pipes which have asbestos insulation are presented. Asbestos quantities can be calculated by applying the information contained herein in conjunction with the piping inventory.

Sampling for this survey was conducted by the PMC during November 1986. Samples were analyzed by Particle Data Laboratories of Elmhurst, Illinois. A total of 42 samples were collected from six different types of insulation.

Section 2.0 of this report describes the overhead piping and its insulation. Section 3.0 presents the sampling methods. Test results are presented in Section 4.0. The laboratory report is presented in Appendix A. Copies of the field data sheets are in Appendix B. Results of the radiological analysis of these samples are in Appendix C.

2.0 DESCRIPTION OF OVERHEAD PIPING AND SAMPLING LOCATIONS

Overhead utilities pipelines are positioned between buildings at the WSCP as shown in Figure 2-1. Insulated and non-insulated process pipelines present had the following contents or functions:

<u>Insulated Pipes</u>

Steam
Ethylene Glycol
Raffinate
Miscellaneous Process Lines (near Building 403)

<u>Non-Insulated Pipes</u>

Fuel Gas
Plant Air
Instrument Air

Locations of overhead utilities, pipes and supports can be found on construction drawings numbered 7500-5 to 7500-28 prepared by Blaw-Knox Company in 1955 and 1956. Bechtel National Incorporated drawings 201-SK22-C-01, 201-SK22-C-02 and 201-SK22-P-01 also show locations of insulated pipes by type of pipe.

The nearest support numbers and construction drawing numbers reported for each sampling location in Appendix B refers to the Blaw-Knox Drawings.

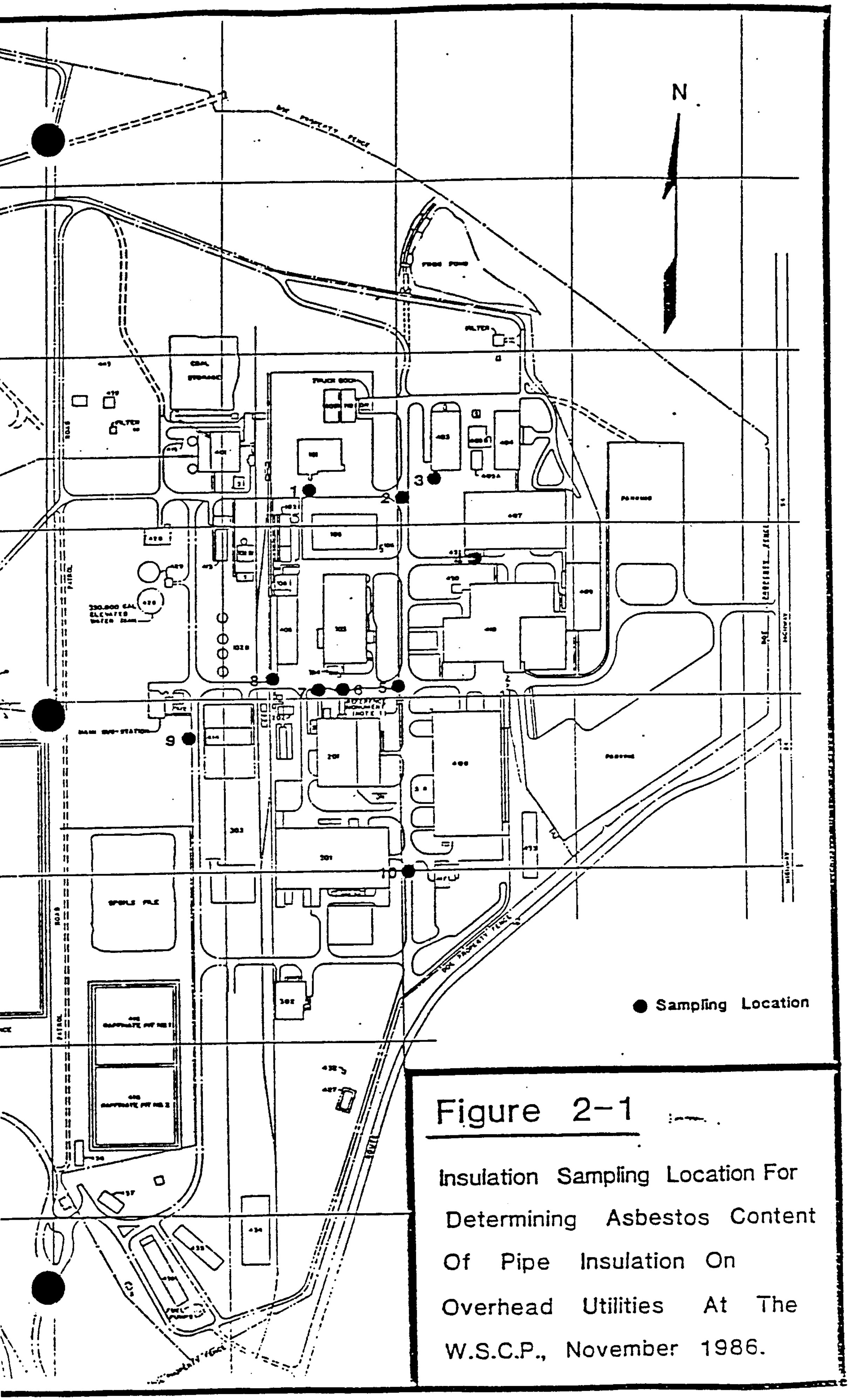


Figure 2-1

Insulation Sampling Location For Determining Asbestos Content Of Pipe Insulation On Overhead Utilities At The W.S.C.P., November 1986.

Figure 2-1 Insulation Sampling Locations for Determining Asbestos Content of Pipe Insulation on Overhead Utilities at the WSCP, November 1986.

3.0 SAMPLING AND ANALYSIS METHODS

Samples were collected from insulation on each type of insulated pipe and from each visibly different type of insulation. Samples were collected from the 42 locations listed in Table 3-1 and shown in Figure 2-1. The sampling locations were selected in such a way that insulation on all types of pipe (steam, raffinate, ethylene glycol and process) and all sizes of pipes of each type could be sampled. Ten sampling zones were chosen. All pipes accessible from a manlift in each of these zones were sampled.

Field data sheets are presented in Appendix B of this report. The pipe diameters shown on the field sheets are estimated for most locations. The thicknesses of insulation are actual measured values for all locations. Support and construction drawing numbers refers to drawings prepared by Blaw-Knox around 1956.

Those samples suspected of containing asbestos were submitted for analysis. One sample from each insulation type (fiberglass and cork) not suspected to contain asbestos was also analyzed.

Each sample was a complete cross-section of the pipe insulation including sheathing. These samples were collected with a hole saw operated with a battery-powered drill. Samples were also collected by hand when the insulation could be easily broken loose without tools. The hole saw and the sampling technicians' gloves were thoroughly decontaminated with a clean water spray between samples. The samples were transferred directly from the hole saw into a Zip-Lok plastic bag and placed in pre-labeled jars.

The samples were divided in half in the laboratory. A clean, dust-free table was used during this operation. Only one sample was open at any one time. The forceps, gloves, and the table top were cleaned with a clean water spray and were dried with clean paper towels between samples.

After all samples were split, planchettes were filled for a radiological survey of the insulation. These planchettes were analyzed for alpha radiation prior to shipping the samples off site. The radiological analysis data is presented in Appendix C.

The samples were analyzed for asbestos content by Particle Data Laboratories of Elmhurst, Illinois. This laboratory is a successful participant in the EPA laboratory evaluation program for asbestos sample analysis. The presence of asbestos in the samples was determined by a polarized light microscopy analytical method and the concentration of asbestos in the sample was determined by volume. Appendix A describes the analysis method in more detail.

Table 3-1 Insulation Sampling Locations for Determining Asbestos Content of Pipe Insulation on Overhead Utilities at the WSCP, November 1986.

SAMPLING ZONE NUMBER	NEAREST SUPPORT NUMBER	ZONE DESCRIPTION (DWG. NO.)	INSULATION SAMPLES COLLECTED SAMPLE NUMBER	PIPE TYPE	SHEATH	SIZE
1	508	NW Corner of	1	Steam	Fiber	18"
		Building 105	2	Ethylene Glycol	Fiber	2"
		(7500-16)	3	Ethylene Glycol	Fiber	6"
			4	Ethylene Glycol	Fiber	6
			5	Elbow (E.G.)	Fiber	18"
			6	Ethylene Glycol	Fiber	6"
			7	Ethylene Glycol	Fiber	24"
2	522	NE Corner of	8	Steam	Fiber	8"
		Building 105	9	Process	Fiber	2"
		(7500-17)	10	Process	Fiber	2"
			11	Process	Fiber	2"
			12	Process	Fiber	2"
			13	Process	Fiber	2"
			14	Ethylene Glycol	Fiber	12"
			15	Ethylene Glycol	Fiber	12"
3	71	NW Corner of	16	Steam	Fiber	6"
		Building 403	17	Ethylene Glycol	Fiber	2"
		(7500-23)	18	Ethylene Glycol	Fiber	2"
			19	Process	Fiber	2"
			20	Process	Fiber	2"
			21	Process	Fiber	1.5"
			22	Process	Fiber	2"
4	731	From Building	23	Ethylene Glycol	Fiber	4"
		407 to 410	24	Ethylene Glycol	Fiber	4"
		(7500-28)	25	Process	Metal	2"
5	40	NE Corner of	26	Raffinate	Fiber	3"
		Building 201	27	Raffinate	Fiber	3"
		(7500-19)	28	Steam	Fiber	18"
6	562	North Center	29	Process	Fiber	4"
		Building 201	30	Raffinate	Fiber	6"
		(7500-24)	31	Raffinate	Metal	4"
			32	Steam	Fiber	4"
			33	Elbow (Steam)	Fiber	4"

SAMPLING ZONE NO.	NEAREST SUPPORT NUMBER	ZONE DESCRIPTION (DWG. NO.)	INSULATION SAMPLES TO BE COLLECTED QUANT.	PIPE TYPE	SHEATH	SIZE
7	564	NE Corner of Building 201 (7500-24)	34	Raffinate	Metal	3"
8	Ground	SW Corner of Building 406 (N.A.)	35	Steam	Fiber	1"
9	764	West of Building 406 (7500-25)	36	Raffinate	Fiber	3"
			37	Raffinate	Fiber	3"
			38	Raffinate	Fiber	3"
			39	Elbow (Raffinate)	Metal	3"
10	84	East Center Building 301 (7500-20)	40	Steam	Fiber	3"
			41	Steam	Fiber	3"
			42	Steam	Fiber	18"

Source: WSSRAP, 1987

4.0 TEST RESULTS

Asbestos concentrations greater than 1.0 percent were found in all insulation samples from steam and raffinate pipes. Asbestos was found on all of the new (non-original) process piping near Building 403. Asbestos was also found on all elbows and all repair sections on all insulated pipes including ethylene glycol pipes. Straight sections of ethylene glycol piping were found to not have asbestos insulation. Table 4-1 presents the test results for each location.

All insulation sampled during this survey was friable. Friable materials are defined by EPA to be asbestos containing when they are greater than 1.0 percent asbestos (40 CFR 61). 40 CFR 61 sets engineering controls for preventing the release of asbestos fibers into the air apply during demolition of any structure which contains friable asbestos.

Radiological contamination was found only in a sample from a location where the exterior sheathing was no longer intact (Appendix C).

Table 4-1 Asbestos Content of Insulation on Overhead Utilities Pipes at the WSCP, November 1986.

Pipe Type	Insulation Type	Friable Asbestos Containing Material
Steam	Plaster	Yes
Raffinate	Plaster	Yes
Elbows on All Insulated Pipes	Plaster over Fiberglass or Animal Hair	Yes
Repair Sections on All Insulated Pipes	Plaster over Fiberglass or Animal Hair	Yes
"New" Process Lines Near Building 403	Plaster or Foam	Yes
Ethylene Glycol	Fiberglass or Cork	No

Source: WSSRAP, 1987.

Appendix A

Laboratory Report on the

Asbestos Content of Pipe Insulation at the WSCP

PARTICLE DATA LABORATORIES, LTD.

115 Hahn Street • Elmhurst, Illinois 60126 • (312) 832-5658

December 17, 1986

MK FERGUSON
RECEIVED
DEC 2 = 1986

Mr. Ken Lee
MK Ferguson Company
Route 2, Highway 94 South
St. Charles, Missouri 63303

RE: Examination of Bulk Samples for Asbestos
P.O. 3589-1002-1256
File No. ES-19-03-01-01
PDL Project: I-11121
EPA Lab I.D. Number 5118

Dear Mr. Lee:

This report covers the asbestos identification by polarized light microscopy of the 32 samples received November 21, 1986.

The attached information tabulates the quantities of fibrous material found in each sample; the numbers will not necessarily add up to 100%, with the balance being filler and binder materials. When a sample is labeled as inhomogeneous, there is the possibility of significantly higher local concentrations than the averaged value reported. This could result in local high airborne asbestos fiber levels if the material is disturbed and appropriate safety precautions are indicated. Also, the symbol (-) indicates not detected.

Identification and quantifications were performed in accordance with Appendix A - Interim Method for the Determination of Asbestos in Bulk Insulation Samples of EPA Asbestos in Schools Regulations, Federal Register, Vol. 47, No. 103, Thursday, May 27, 1982. Analysis was initiated by a gross examination of the sample as received. Any obvious fractions were noted and samples of each fraction were mounted for polarized light microscopy in a 1.515 index liquid. When mounting samples any fiberous material is thoroughly separated for examination. Preliminary evaluation to determine the possible species of asbestos present is performed by morphology, birefringence and refractive index relative to the mounting fluid. Concurrently the relative abundance of any asbestos material, other fibers, fillers and binders is determined. Quantities are based on areal coverage and thickness of the various species present. The term trace means 0.1% or less. Identification of non-asbestos material is not as rigorous as these are not the species of interest.

PARTICLE DATA LABORATORIES, LTD.

When asbestos type fibers are seen morphologically, they are additionally characterized by immersion matching in refractive index liquid using both white light and sodium d-line. A numeric determination of birefringence is available based on the index measurments. A sample has to fit into the accepted ranges of indices, birefringence and morphological features to be classed as asbestos.

The features of the various forms of asbestos are as follows:

Amosite: Straight thin single fibers and bundles of such fibers usually with cleanly broken ends on individual fibers; refractive indices of 1.700 and 1.695, birefringence 0.020-0.033 and parallel extinctions.

Chrysotile: Thin fibers and fiber bundles with both straight and wavy sections. The ends of bundles tend to be frayed. Indices are 1.529-1.559 and 1.537-1.576, birefringence of 0.004-0.016 and the fibers exhibit parallel extinction.

Anthophylite: Similar in morphology to amosite but indices of 1.60-1.64, birefrigence of 0.013 -0.025 and extinction varying from parallel to 15 degrees oblique.

Crocidolite: Similar in morphology to amosite but is distinguished by blue to blue-green pleochroic coloration and indices of 1.680-1.698 and 1.685-1.706. It is commonly referred to as blue asbestos.

Tremolite-Actinolite Series: Transparent, elongated furrowed prisms, usually with uneven, jagged ends and smooth sides, with oblique extinction and positive elongation; indices are 1.559-1.612 and 1.625-1.637. The two minerals are very similar optically and grade into each other.

~~Attached are representative photomicrographs of each sample and~~ a compendium of the materials found. The micrographs are taken with crossed polars and a first order red compensator which results in the pink background and shows birefringence as bright colors other than the background and isotropic transparent material as the same color as the background.

Samples will be retained for six months unless otherwise instructed.

It has been a pleasure serving you, and we look forward to serving you again in the near future.

Respectfully submitted,

PARTICLE DATA LABORATORIES, LTD.

Olga Kist

Olga Kist
Research Microscopist

BULK SAMPLE ANALYSIS FOR ASBESTOS CONTENT

CLIENT: MK-Ferguson Company

PDL PROJECT: I- 11121

SAMPLE I.D.	HOMO-GENOUS	ASBESTOS FORMS (PERCENTS-BY-WEIGHT)				NON-ASBESTOS FIBERS (PERCENTS-BY-WEIGHT)		
		CHRYSOTILE	AMOSITE	CROCIDOLITE	OTHER	FIBERGLASS	PAPER	OTHER FIBERS
1. TN 2000-1	No	30	10-20	--	--	1-2	1-2	--
2. TN 2000-3	No	trace	--	--	--	60	3-5	--
3. TN 2000-5A (Light)	No	20-30	--	--	--	20	--	--
4. TN 2000-5B (Dark)	Yes	trace	--	--	--	1-2	trace	animal hair/90
5. TN 2006-6	No	5-10	--	--	--	80	--	--
6. TN 2006-8	No	5-10	40	--	--	trace	1-2	--
7. TN 2000-9	No	10	30	--	--	--	5	--
8. TN 2000-10	NO	20-30	trace-0.5	--	--	trace	trace	animal hair/1-2
9. TN 2000-12	Yes	--	30	--	--	--	--	--
10. TN 2000-16	No	5-10	30	--	--	--	1-2	--
11. TN 2000-18	No	1-2	--	--	--	70-80	10	animal hair/trace -0.5
12. TN 2000-19	No	20	20-30	--	--	--	1-2	cotton/5-10 animal hair/1-2
13. TN 2000-20	NO	10-20	--	--	--	--	1-2	animal hair/1-2
14. TN 2000-21	NO	1-2	--	--	--	3-5	trace	--
15. TN 2000-22	No	--	10-20	--	--	--	10-20	--

BULK SAMPLE ANALYSIS FOR ASBESTOS CONTENT

CLIENT: MK-Ferguson
Page 2

PDL PROJECT: I - 11121

SAMPLE I.D.	HOMO-GENOUS	ASBESTOS FORMS (PERCENTS-BY-WEIGHT)				NON-ASBESTOS FIBERS (PERCENTS-BY-WEIGHT)		
		CHRYSOTILE	AMOSITE	CROCIDOLITE	OTHER	FIBERGLASS	PAPER	OTHER FIBERS
16. IN 2000-25	Yes	1-2	20-30	--	--	--	trace	--
17. IN 2000-26	No	5-10	20	1-2	--	--	5-10	cotton/10
18. IN 2000-27	No	10	10	--	--	--	3-5	--
19. IN 2000-28	NO	20-30	20-30	--	--	--	5	--
20. IN 2000-29	No	5-10	20	--	--	--	5-10	--
21. IN 2000-30	No	10-20	30-40	--	--	--	--	--
22. IN 2000-31	No	10	10-20	--	--	--	3-5	--
23. IN 2000-32	No	--	trace*	--	--	90	--	*synthetic/trace -0.5 Hair & Feathers/ 1-2
24. IN 2000-33	No	20-30	20-30	--	--	--	--	--
25. IN 2000-34	Yes	1-2	20-30	--	--	--	--	--
26. IN 2000-35	No	5-10	20	--	--	--	5	--
27. IN 2000-36	Yes	20	30-40	--	--	--	--	--
28. IN 2000-37	NO	1-2	20-30	--	--	--	1-2	--
29. IN 2000-38	No	10-20	20-30	--	--	10	trace	--
30. IN 2000-40	Yes	5	1-2	--	--	80	trace	--

BULK SAMPLE ANALYSIS FOR ASBESTOS CONTENT

CLIENT: MK-Ferguson
Page 3

PDL PROJECT: I - 11121

SAMPLE I.D.	HOMO-GENOUS	ASBESTOS FORMS (PERCENTS-BY-WEIGHT)				NON-ASBESTOS FIBERS (PERCENTS-BY-WEIGHT)		
		CHRYSOTILE	AMOSITE	CROCIDOLITE	OTHER	FIBERGLASS	PAPER	OTHER FIBERS
31. IN 2000-41	No	5-10	40	--	--	--	10	--
32. IN 2000-42	No	10-20	30	--	--	--	5-10	--

* = Sample IN 2000-32 has inhomogeneous portion (possible contamination) consisting of animal hair feathers and synthetic fibers. this material does burn, indicating it not to be asbestos material.

Appendix B

Field Data Sheets for Bulk Material Sampling for Asbestos Content of Pipe Insulation at the WSCP

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-1 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 508

~~Sec~~ SAMPLING ZONE 1

Construction Drawing 7500-16

Other SOUTHERN-MOST PIPE ON TOP RACK

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 18 inches

Pipe Type: X Steam, ___ Ethylene Glycol, ___ Raffinate,

___ Other ___

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Fiber [illegible] / tarpaper

DESCRIPTION OF MATERIAL

Color: WHITE

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 3 inches

COMMENTS ___

Radiation Level — 0.4 DPM

___ Background Only

___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] Company: [illegible]

[illegible]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-2 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES
~~Floor~~ NEAREST SUPPORT NO.: 508
~~Room~~ SAMPLING ZONE: 1
Construction Drawing 7500-16
Other 2nd Pipe from South on Top Rack

MATERIAL TYPE

X Pipe Insulation
Pipe Diameter: 2" inches
Pipe Type: ___ Steam, X Ethylene Glycol, ___ Raffinate, ___ Other ___
___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ~~[illegible]~~ Tar paper

DESCRIPTION OF MATERIAL

Color: ___
Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)
Thickness: 3 inches

COMMENTS FIBERGLASS

Radiation Level
___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] Company: [illegible] Engineering
[illegible]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-3 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 508

~~Room~~ SAMPLING ZONE 1

Construction Drawing 7500-16

Other 3rd from North on Top Rack

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 6 inches

Pipe Type: ____ Steam, X Ethylene Glycol, ____ Raffinate,

____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ~~=~~ (Tar paper)

DESCRIPTION OF MATERIAL

Color: ____

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 3 inches

COMMENTS Fiberglass

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: K. Allen, 11/17/86 Company: Jacobs Engineering

[illegible] GORANI

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-4 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 508

~~Room~~ SAMPLING ZONE 1

Construction Drawing 7500-16

Other 2nd From North on Top Rack

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 6 inches

Pipe Type: ____ Steam, X Ethylene Glycol, ____ Raffinate, ____ Other

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ~~[illegible]~~ Tar Paper

DESCRIPTION OF MATERIAL

Color:

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 3 inches

COMMENTS Fiberglass

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument:

Sample Collection Personnel: [illegible] 11/17/86 [illegible] Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-5 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 508

~~Sec.~~ SAMPLING ZONE 1

Construction Drawing 7500-16

Other Elbow on top of 2nd Pipe from North - New Construction

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ≈ 2 ELBOW inches

Pipe Type: ___ Steam, X Ethylene Glycol, ___ Raffinate, ___ Other

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other FIBER (Brown)

DESCRIPTION OF MATERIAL

Color: White plaster / brown inner material

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 3 inches

COMMENTS T component on top of Ethylene Glycol line (Elbow)

Radiation Level 0.4 DPM

___ Background Only

___ Above Background ___ cpm Instrument:

Sample Collection Personnel: Kurt Alcorn 11/17/86 Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-6 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 508

~~Room~~ SAMPLING ZONE 1

Construction Drawing 7500-16

Other Coming down from 2nd Pipe From North on top rack - Leads to "Tank" on lower level

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ≈6 inches

Pipe Type: ___ Steam, X Ethylene Glycol, ___ Raffinate,

___ Other ___

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other FIBER Tar Paper

DESCRIPTION OF MATERIAL

Color: BROWN

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 3 inches

COMMENTS Does not Look like other fiber glass. Material unknown. Straight section coming down from V.E.G. line (from) sample. CORK

Radiation Level 1.1 DPM

___ Background Only

___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-7 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 308

~~Room~~ SAMPLING ZONE 1

Construction Drawing 7500-16

Other "Tank" on lower Rack

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ≈24 inches

Pipe Type: ____ Steam, X Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling
____ Floor
____ Wall
____ Boiler Insulation
____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tarpaper

DESCRIPTION OF MATERIAL

Color: BRown

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 3 inches

COMMENTS CORK INSULATION

Radiation Level

____ Background Only
____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: [illegible] 11/17/86 Company: Jacobs Engineering

[illegible]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-8 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 522

~~Room~~ SAMPLING ZONE 2'

Construction Drawing 7500-17

Other Top Rack, Farthest South

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~~14~~ ≈10 inches

Pipe Type: X Steam, ____ Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tar Paper

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 2 1/2 inches

COMMENTS ~~[illegible]~~ ≈14" O.D. w/ insolation

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: [illegible] 11/17/86 Company: Jacobs Engineering

[signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-9 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 502

~~Room~~ SAMPLING ZONE 2

Construction Drawing 7500-17

Other 2nd level, Farthest South

MATERIAL TYPE

X Pipe Insulation
Pipe Diameter: 2" inches
Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate, X Other Process ?

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tarpaper

DESCRIPTION OF MATERIAL

Color: WHITE

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 1 1/2 inches

COMMENTS 2" Stainless Steel pipe

Radiation Level 0.4 ~~[illegible]~~ DPM

___ Background Only
___ Above Background ___ cpm Instrument:

Sample Collection Personnel: [illegible] Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-10 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 52

~~Room~~ SAMPLING ZONE 2

Construction Drawing 7500-17

Other 3rd level down, Farthest South

MATERIAL TYPE

X Pipe Insulation
Pipe Diameter: 2" inches
Pipe Type: ___ Steam, ___ ? Ethylene Glycol, ___ Raffinate,
X Other ? Process ?

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tar paper Cover

DESCRIPTION OF MATERIAL

Color: white

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: ~~2"~~ 1½" inches

COMMENTS 2" Stainless steel pipe

Radiation Level 0.0 DPM

___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [signature] 11-17-86 Company: Jacobs Engineering

[signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-11 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: ~~522~~

~~Sec.~~ SAMPLING ZONE 2

Construction Drawing 7500-17

Other Lowest pipe at the Section

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 2" inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate, X Other Process ?

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tar Paper Cover

DESCRIPTION OF MATERIAL

Color: Yellow

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 2 inches

COMMENTS 2" dia Steel Pipe
Fiber glass ~~[illegible]~~ Insulation
Sheathing Torn at Sampling Location

Radiation Level 7.2 DPM - do not ship offsite

___ Background Only

___ Above Background ___ cpm Instrument:

Sample Collection Personnel: [illegible] 11/17/86 [illegible] Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-12 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 522

~~Sec.~~ SAMPLING ZONE 2

Construction Drawing 7500-17

Other middle pipe 2nd level from the top

MATERIAL TYPE

X Pipe Insulation
 Pipe Diameter: 2" inches
 Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate,
 X Other Process ?

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tar / paper

DESCRIPTION OF MATERIAL

Color: White Light insulation

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 1 1/2" inches

COMMENTS Stainless Steel

Radiation Level
___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: Keith Mona [illegible] Company: Jacobs Engineering
[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-13 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 502

~~Room~~ SAMPLING ZONE 2

Construction Drawing 7500-17

Other 2nd Level Down, farthest North

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 2 inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate, x Other Process ?

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ~~F~~ None , Netting

DESCRIPTION OF MATERIAL

Color: Grey

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 1 1/2 inches

COMMENTS Like-Styrofoam (Grey)

Black cover

Stainless Steel construction pipe

Radiation Level 0.0 DPM

___ Background Only

___ Above Background ___ cpm Instrument:

Sample Collection Personnel: Kurt Albers 11/17/86 Company: Jacobs Engineering

[signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-14 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 522

~~Room~~ SAMPLING ZONE 2

Construction Drawing 7500-17

Other Top Level, 3rd From North

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~~[illegible]~~ 12 ? inches

Pipe Type: ____ Steam, X Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other (TAR Paper Sheet)

DESCRIPTION OF MATERIAL

Color: Yellow

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 2 inches

COMMENTS FIBER GLASS Insulation

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: Kirk [illegible] 11/17/86 Company: Jacobs Engineering

[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-15 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 522

~~Sec.~~ SAMPLING ZONE 2

Construction Drawing 7500-17

Other Top Level, 2nd from North

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~~10~~ 12? inches

Pipe Type: ____ Steam, X Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling
____ Floor
____ Wall
____ Boiler Insulation
____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR Paper Sheet

DESCRIPTION OF MATERIAL

Color: Yellow

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 2 inches

COMMENTS FIBER GLASS Insulation

Radiation Level

____ Background Only
____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: [illegible] 11/17/86 Company: Jacobs Engineering

[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-16 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 71

~~Room~~ SAMPLING ZONE 3

Construction Drawing 7500-23

Other Top Level 2nd from East

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 6 inches

Pipe Type: X Steam, ____ Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling
____ Floor
____ Wall
____ Boiler Insulation
____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR Paper Cover

DESCRIPTION OF MATERIAL

Color: White ~~Gray~~ Insulation

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 1 1/2" inches

COMMENTS ~~[illegible]~~

One missing from the blue print

Radiation Level
____ Background Only
____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: Keith McI... Mit... Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-17 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 71

~~Room~~ SAMPLING ZONE 3

Construction Drawing 7500-23

Other Top, 2nd from East

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 2" ? inches

Pipe Type: ___ Steam, X Ethylene Glycol, ___ Raffinate,

___ Other ___

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR Paper Cover

DESCRIPTION OF MATERIAL

Color: Yellow

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 3" inches

COMMENTS Fiberglass

Radiation Level

___ Background Only

___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: Kurt Manenhinkel [illegible] Company: [illegible] Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-18 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 71

~~Room~~ SAMPLING ZONE 3

Construction Drawing 7500-23

Other Top, farthest East

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 2" ? inches

Pipe Type: ___ Steam, X Ethylene Glycol, ___ Raffinate, ___ Other ___

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR PAPER ...

DESCRIPTION OF MATERIAL

Color: Yellow

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 3" inches

COMMENTS FIBERGLASS

Radiation Level
___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] 11/17/86 Company: Jacobs E...

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-19 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 71

~~Room~~ SAMPLING ZONE 2

Construction Drawing 7500-23

Other 2nd level from Top farthest East

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 2" inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate, ___ Other ?

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR Paper Cover

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 2" inches

COMMENTS Stainless Steel Fiber

Radiation Level

___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: Keith Allen 11/17/86 Company: Jacobs Engineering

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Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-20 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 71

~~Room~~ SAMPLING ZONE 3

Construction Drawing 7500-23

Other Bottom level farthest East

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 2" inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate, X Other Process ?

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR Paper cover

DESCRIPTION OF MATERIAL

Color: White Light Insulation

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 2" inches

COMMENTS Stainless ~~steel~~ steel

Radiation Level

___ Background Only

___ Above Background ___ cpm Instrument:

Sample Collection Personnel: [illegible] Company: Jacobs Engineering

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Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-21 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 71

~~Room~~ SAMPLING ZONE 3

Construction Drawing 7500-22

Other 2nd level from top Furthest West.

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 1½ inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate, X Other Process ?

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ___

DESCRIPTION OF MATERIAL

Color: GREY

Hardness: ___ Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 1" inches

COMMENTS Styro Foam material (Black), Stainless Steel Pipe

Radiation Level
___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible]

Company: [illegible] Jacobs Engineering

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Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-22 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 71

~~Seam~~ SAMPLING ZONE 3

Construction Drawing 7500-23

Other Bottom level furthest west.

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 2" inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate,

X Other PROCESS ?

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ~~TAR~~ Paper cover

DESCRIPTION OF MATERIAL

Color: White ~~[illegible]~~

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 2" inches

COMMENTS Stainless Steel Pipe

Radiation Level

___ Background Only

___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] 11/17/86 Company: Jacobs Engineering

[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000- 23 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 731

~~Room~~ SAMPLING ZONE 4

Construction Drawing 7500-28

Other Furthest west

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 4 inches

Pipe Type: ___ Steam, X Ethylene Glycol, ___ Raffinate, ___ Other ___

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR [illegible] Cover

DESCRIPTION OF MATERIAL

Color: Yellow

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 2" inches

COMMENTS Fiber Glass
(Sample label stuck to bottle base)

Radiation Level

___ Background Only

___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] 11/17/86 Company: Jacobs Engineering

[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
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BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-24 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES
~~Floor~~ NEAREST SUPPORT NO.: 731
~~Room~~ SAMPLING ZONE 4
Construction Drawing 7500-38
Other EAST End.

MATERIAL TYPE

X Pipe Insulation
Pipe Diameter: 6 inches
Pipe Type: ___ Steam, X Ethylene Glycol, ___ Raffinate,
___ Other ___

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR paper cover

DESCRIPTION OF MATERIAL

Color: Yellow
Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)
Thickness: 3" inches

COMMENTS FIBER GLASS

Radiation Level
___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
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BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-26 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 38

~~Room~~ SAMPLING ZONE 5

Construction Drawing 7500-19

Other top level

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ≈ 4 inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, X Raffinate,

___ Other

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR paper cover

DESCRIPTION OF MATERIAL

Color: Wht

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 1 1/2" inches

COMMENTS Steam

Radiation Level

___ Background Only

___ Above Background ___ cpm Instrument:

Sample Collection Personnel: [signature] 11/17/86 Company: Jacobs Engineering

[signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-27 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 38

~~Room~~ SAMPLING ZONE 5

Construction Drawing 7500-19

Other 2nd Level Furthest West From Top

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ≈ 4" inches

Pipe Type: ____ Steam, ____ Ethylene Glycol, X Raffinate,

____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Metal Cover

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 2½" inches

COMMENTS Stainless Steel Pipe

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: Kip Meier 11/17/86 Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-28 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 38

~~Room~~ SAMPLING ZONE 5

Construction Drawing 7500-19

Other 2nd from west.

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ? 8 ~~8~~ 18 inches

Pipe Type: X Steam, ___ Ethylene Glycol, ___ Raffinate, ___ Other ___

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR paper cover

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 3" inches

COMMENTS ___

Radiation Level

___ Background Only
___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] 11/17/86 Company: [illegible]

[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
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BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000- 29 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 562

~~Room~~ SAMPLING ZONE 6

Construction Drawing 7500-24

Other Lowest one

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ≈ 4" inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, ___ Raffinate,

X Other Process ?

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR Paper Cover

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 1 1/2 inches

COMMENTS

Radiation Level

___ Background Only

___ Above Background ______ cpm Instrument:

Sample Collection Personnel: Vit Mu... 11/17/86 Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8066 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-30 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 562

~~Room~~ SAMPLING ZONE 6

Construction Drawing 7500-24

Other Right Above IN-2000-29 Second South.

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 6" inches

Pipe Type: ____ Steam, ____ Ethylene Glycol, X Raffinate, ____ Other

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR Paper

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 2" inches

COMMENTS

Radiation Level 0.0 DPM

____ Background Only

____ Above Background ____ cpm Instrument:

Sample Collection Personnel: [illegible] 11/17/86 Company: Jacobs Engineering

[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-31 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 562

~~Room~~ SAMPLING ZONE 6,

Construction Drawing 7500-24

Other Top furthest north.

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 4" inches

Pipe Type: ____ Steam, ____ Ethylene Glycol, X Raffinate,

____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Metal Cover

DESCRIPTION OF MATERIAL

Color: WHITE

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 2" inches

COMMENTS ____

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: V. A. N... 11/17/86 Company: Jacobs Engineering

_ ACTION PROJECT (WSSRAP)
Charles, Missouri 63303
Telex (314) 447-0803

OR ASBESTOS - FIELD DATA

Date: NOVEMBER 17, 1986

UILDING OVERHEAD UTILITIES

5C2

E

500-24

Elbow 3rd from ~~[illegible]~~ EAST

W

___ inches
___ Ethylene Glycol, ___ Raffinate,

TAR paper Care

~~[illegible]~~

_ Granular (Soft), or ___ Hard (Concrete-Like)

cpm Instrument: ___

C. ___ Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-33 Date: NOVEMBER 17, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES
~~Floor~~ NEAREST SUPPORT NO.: 56a
~~Room~~ SAMPLING ZONE C
Construction Drawing 7500-24
Other Elbow 1st from west

MATERIAL TYPE

X Pipe Insulation ELBOW
Pipe Diameter: ? ≈4 inches
Pipe Type: X ? Steam, ____ Ethylene Glycol, ____ Raffinate,
____ Other ____

____ Ceiling
____ Floor
____ Wall
____ Boiler Insulation
____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR paper Cover

DESCRIPTION OF MATERIAL

Color: Brown
Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)
Thickness: ≈2 inches

COMMENTS ____

Radiation Level
____ Background Only
____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: Kurt Mason 11/17/86 Company: Jacobs Engineering

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BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-34 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 569

~~Sec.~~ SAMPLING ZONE 7

Construction Drawing 7500-24

Other Top Level - Farthest North

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~ 4" inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, X Raffinate,

___ Other ___

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other METAL [illegible]

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 2 3" inches

COMMENTS Stainless steel pipe

Radiation Level

___ Background Only

___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [illegible] 11/18/86 Company: Jacobs Engineering

[illegible]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-35 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: GROUND (NEAR 406)

~~Sec.~~ SAMPLING ZONE 8

Construction Drawing ~~7500~~ NA.

Other Vertical Pipe at SW corner of Rail Loading Dock at Building-406

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 1 inches

Pipe Type: X Steam, ____ Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tarpaper

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 1 1/2 inches

COMMENTS

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: Kurt Ulm[illegible] 11/18/86 Company: Jacobs Engineering

[illegible signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
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BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-36 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 764

~~Sect~~ SAMPLING ZONE 9

Construction Drawing 7500-25

Other Top, Farthest East

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~4 inches

Pipe Type: ___ Steam, ___ Ethylene Glycol, X Raffinate, ___ Other ___

___ Ceiling
___ Floor
___ Wall
___ Boiler Insulation
___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR PAPER COVER

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: 2" inches

COMMENTS Steel Pipe - Real Bad Condition

Radiation Level

___ Background Only
___ Above Background ___ cpm, Instrument: ___

Sample Collection Personnel: [illegible signature] 11/18/86 Company: Jacobs Engineering

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Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-37 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 754

~~Room~~ SAMPLING ZONE 9'

Construction Drawing 7500-25

Other Top-Level 2nd from East.

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~4" inches

Pipe Type: ____ Steam, ____ Ethylene Glycol, X Raffinate, ____ Other ____

____ Ceiling
____ Floor
____ Wall
____ Boiler Insulation
____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other ____

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 3" inches

COMMENTS Stainless Steel Pipe

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: [signature] 11/18/86 Company: Jacobs Engineering

SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
ute 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

ILK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

IN-2000-38 Date: NOVEMBER 10, 1986

IN

ng Number: INTER-BUILDING OVERHEAD UTILITIES

NEAREST SUPPORT NO.: 764

SAMPLING ZONE 9

uction Drawing 7500-35

Elbow - Top level farthest East

Insulation

ipe Diameter: ~4" inches

ipe Type: ____ Steam, ~~Glycol~~ Ethylene Glycol, X Raffinate,

____ Other

ng

- Insulation

RIAL

, Plaster, None, Other TAR PAPER COVER

MATERIAL

White

X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

3" inches

Steel Pipe

0.0 DPM

ground Only

e Background ____ cpm Instrument: ____

nel: [signature] 11/18/86 Company: Jacobs Engineering

[signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-39 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 764

~~Room~~ SAMPLING ZONE 9

Construction Drawing 7500-25

Other Elbow - Small Section of Repair

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~4" inches

Pipe Type: ~~Steam~~, ___ Ethylene Glycol, X Raffinate, ~~___~~ Other ___

___ Ceiling

___ Floor

___ Wall

___ Boiler Insulation

___ Other ___

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR PAPER COVER

DESCRIPTION OF MATERIAL

Color: Yellow

Hardness: X Fibrous (Friable), ___ Granular (Soft), or ___ Hard (Concrete-Like)

Thickness: ~2 inches

COMMENTS FIBER GLASS

Radiation Level

___ Background Only

___ Above Background ___ cpm Instrument: ___

Sample Collection Personnel: [signature] 11/18/86 Company: Jacobs Engineering

[signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-40 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 84

~~Room~~ SAMPLING ZONE 10

Construction Drawing 7500-20

Other Elbow -Top level

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~4" inches

Pipe Type: X Steam, ____ Ethylene Glycol, ____ Raffinate,

____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other TAR paper Cover

DESCRIPTION OF MATERIAL

Color: White

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 3" inches

COMMENTS Steel pipe

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: [signature] 11/18/86 Company: Jacobs Engineering

[signature]

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA

SAMPLE NUMBER: IN-2000-41 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: 56

~~Room~~ SAMPLING ZONE

Construction Drawing 7500-20

Other ~~2nd level - [illegible]~~ Straight section of small pipe

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: ~ 4" inches

Pipe Type: X Steam, ____ Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling

____ Floor

____ Wall

____ Boiler Insulation

____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tar Paper

DESCRIPTION OF MATERIAL

Color: White Asbestos

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 2" ~~[illegible]~~ inches

COMMENTS

Radiation Level

____ Background Only

____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: Kurt Mann 11/18/86 [illegible] Company: Jacobs Engineering

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
Route 2, Highway 94, St. Charles, Missouri 63303
Phone (314) 441-8086 Telex (314) 447-0803

BULK MATERIAL SAMPLING FOR ASBESTOS - FIELD DATA 18

SAMPLE NUMBER: IN-2000-42 Date: NOVEMBER 18, 1986

SAMPLING LOCATION

Building Number: INTER-BUILDING OVERHEAD UTILITIES

~~Floor~~ NEAREST SUPPORT NO.: S4

~~Room~~ SAMPLING ZONE 10

Construction Drawing 7500-20

Other ~~[illegible]~~ 2nd level - farthest west

MATERIAL TYPE

X Pipe Insulation

Pipe Diameter: 18 inches

Pipe Type: X Steam, ____ Ethylene Glycol, ____ Raffinate, ____ Other ____

____ Ceiling
____ Floor
____ Wall
____ Boiler Insulation
____ Other ____

COVER OVER MATERIAL

Fiber, Metal, Plaster, None, Other Tarpaper

DESCRIPTION OF MATERIAL

Color: white

Hardness: X Fibrous (Friable), ____ Granular (Soft), or ____ Hard (Concrete-Like)

Thickness: 3" inches

COMMENTS ____

Radiation Level

____ Background Only
____ Above Background ____ cpm Instrument: ____

Sample Collection Personnel: [signature] 11/18/86 Company: Jacobs Engineering
[signature]

Appendix C

Radiological Contamination of Samples Collected to Measure Asbestos Content of Pipe Insulation at the WSCP

2.06 VEHICLE/EQUIPMENT RELEASE FOR UNRESTRICTED USE CONTAMINATION SURVEY FORM

Property # NA   Date 11/19/86   HP C.T. ALSTON

Survey Instrument: LUDLUM EMC

Meter Model # ______   Probe Model # ______
Meter Serial # ______   Probe Serial # ______
Due for Calibration ______   Background ______ cpm

Detector Area ______   Scintillation Detec. YES NO

Correction Factor ______   Pancake Detec. YES NO

Release Criteria
o Fixed + Removable (By Direct Survey) : 5000 dpm/100cm²

Counter: LUDLUM ALPHA SCINTILLATION

Scaler Model # 2000   Detector Model # 43-2
Scaler Serial # 35714   Detector Serial # 21949
Due for Calibration ______   Background 3/60 (.05) cpm

Detector Efficiency (Eff) 13.2 % Th²³⁰.

o Removable (By Smear) : 1000 dpm/100 cm²

DIRECT SURVEY					SMEAR SURVEY					
ITEM SURVEYED	LOCATION SURVEYED	GROSS cpm	NET (GROSS-BKG)	TOTAL ACTIVITY dpm/100cm² (NET X CF / DETEC. AREA X 100)	GROSS cpm	NET (GROSS-BKG)	TOTAL ACTIVITY DPM (NET/EFF)	RELEASE	DECON	REMARKS
ASBESTOS SAMPLE #1 LN-2000-1	PLANCHET	NA	NA	NA	0.10	0.05	0.4	✓		Tc=10m.
#5	"				0.10	0.05	0.4	✓		2σ BKG=
#6	"				0.20	0.15	1.1	✓		0.06 cpm
#9	"				0.10	0.05	0.4	✓		
#10	"				0.00	0.00	0.0	✓		
#11	"				1.00	0.95	7.2	X		
#13	"				0.00	0.00	0.0	✓		
#30	"				0.00	0.00	0.0	✓		
#38	"				0.00	0.00	0.0	✓		

MKE DOCUMENT NO. 5121 - C : DW - D - 01 - 0118 - 00

U. S. DEPARTMENT OF ENERGY

OAK RIDGE, TENNESSEE

CHEMICAL PLANT
CONSTRUCTION DRAWINGS

LOCATION MAP, VICINITY MAP & LIST OF DRAWINGS

DESIGNED [illegible]	DRAWN JMM/AMC
CHECKED [illegible]	
INSPECTED [illegible]	
RECOMMENDED [illegible]	

APPROVED	DATE	CHIEF ENG./QA MGR	DATE	PMC ENG'G. MGR.	DATE	DOE PROJ. ENG
[illegible]	[illegible]	[illegible]	[illegible]			

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON-KNUDSEN COMPANY
WSSRA PROJECT
180 HOWARD ST. SAN FRANCISCO, CA 94105

PROJECT NO. DE-AC05-86OR21548

DRAWING NO. 5121E-CP-532

REV 0

—	—	—	—
QA MKE	ENG'G MGR	QA MK-F	DOE APP.

MKE DOCUMENT NO. 5121 - C : DW - D - 01 - 0119 -00

U. S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

CHEMICAL PLANT
CONSTRUCTION DRAWINGS

EXISTING SITE PLAN

DESIGNED	DRAWN JMM		
CHECKED D Raymond 2/10/87			
INSPECTED D Raymond 2/10/87			
RECOMMENDED P R Simmons 4-8-87			
APPROVED Philip C. Thuren 4-8-87	CHIEF ENG./QA MGR. DATE 8 Apr 87 4/8/87	PMC ENG'G. MGR. DATE	DOE PROJ. ENG. DATE

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON-KNUDSEN COMPANY
WSSRA PROJECT
180 HOWARD ST SAN FRANCISCO, CA 94105

PROJECT NO. DE-AC05-86OR21548

DRAWING NO. 5121E-CP-533 REV 0

QA MKF	ENG'G MGR.	QA MK-F	DOE APP.
—	—	—	—

MKE DOCUMENT NO. 5121-C:DW-D-01-0120-01

U. S. DEPARTMENT OF ENERGY

OAK RIDGE, TENNESSEE

DRAWN AMC 2/10/87	CHEMICAL PLANT CONSTRUCTION DRAWINGS PLAN OVERHEAD PIPING & SUPPORT REMOVAL NORTH (SHEET 1 OF 2)
2/10/87	
D 4-8-87	

DATE	CHIEF ENG./QA MGR. DATE	PMC ENG'G. MGR. DATE	DOE PROJ. ENG. DATE
4-8-87	4/8/87		

RISON-KNUDSEN ENGINEERS, INC.
SON KNUDSEN COMPANY
RA PROJECT
WARD ST. SAN FRANCISCO, CA 94105

PROJECT NO. DE-AC05-86OR21548

DRAWING NO. 5121E-CP-534

REV 1

MKE DOCUMENT NO. 5121-C-DW-D-01-0121-01

U. S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

DESIGNED	DRAWN
DWL	AMC

CHECKED
INSPECTED
RECOMMENDED 4-5-87

CHEMICAL PLANT
CONSTRUCTION DRAWINGS
PLAN
OVERHEAD PIPING & SUPPORT REMOVAL
SOUTH (SHEET 2 OF 2)

APPROVED	DATE	CHIEF ENG./QA MGR.	DATE	PMC ENG'G. MGR.	DATE	DOE PROJ. ENG.	DATE

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON-KNUDSEN COMPANY
WSSRA PROJECT

PROJECT NO. DE-AC05-86OR21548

DRAWING NO. 5121E-CP-535

REV 1

—	—	—
ENG'G MGR.	QA MK-F	DOE APP.

IRA-400-404

 Admin File R.C-IIA 4 - [illegible]

cc: D. R. Lewis
R. A. Nelson
A. J. Stewart

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

3589-87-I-EPA-010

NOV 5 1987

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Electric Power and Pole Removal,
- Overhead Piping/Asbestos Removal,
- Cleanup of Vicinity Property No. 7 on the Army Reserve Area, and
- Disposal of Containerized Chemicals.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

FILE NUMBER: ______________ MH-A-01-02

001812
11-6-87

We will provide any comments on these within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay
Regional Administrator

cc: Dr. Fred Brunner, MDNR

bc: Robert Morby
Dan Shiel
Rowena Michaels
Ron Ritter

4711

NOV 10 1987

CONCURRENCES
RTG SYMBOL PEER
INITIALS/SIG. J. Coyn
DATE 11/9/8
RTG SYMBOL CE-541
INITIALS/SIG. R. Nels
DATE 11/9/8
RTG SYMBOL
INITIALS/SIG.
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INITIALS/SIG.
DATE

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of October 8, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: D. Bedan, MDNR
E. Brown, FLW
w/enclosure

FILE NUMBER: ______________

DOE F 1325.10
(7-79)

PEER:JCoyne:x41:mw:11/9/87 (c:IRACom.Ltr.)

OFFICIAL FILE COPY

RESPONSES TO USEPA REVIEW COMMENTS
ON IRA PACKAGES

Cleanup of Vicinity Property No. 7, Army Reserve Area

Comment: The proposal to cleanup this vicinity property calls for excavating the contaminated area to a depth of six (6) inches or where the radium concentration is below 15 pCi/g and then backfilling with clean material. The EPA suggests that while its criteria for residual radium in soil is satisfied by this approach, that we consider removing additional soil to reduce the concentration to below 5 pCi/g. As the area is small, little additional excavation would be required.

Response: Subsequent to the preparation of the IRA package for Army Reserve Vicinity Property #7, the Deparment of Army requested that the area not be backfilled upon completion of the cleanup as proposed by the DOE. The DOE will leave the excavation area open and apply the suface criteria of 5 pCi/g to this particular vicinity property.

Disposal of Containerized Chemicals

Comment: It is suggested that the specifications for this work might be strengthened by adding waste characterization procedures into Section 2.0 (Scope) of the document. The procedures are those which may be required under 40 CFR 260-268, or others required by the permit held by the Treatment, Storage and/or Disposal Facility.

Response: Procedures required in 40 CFR 260-268 will be referenced in Section 2.0 of the Request for Proposal. In addition, it will be emphasized that all waste characterization procedures which are required by the successful bidder's treatment, storage and/or disposal facilities permit must be satisfied. It will be required that these procedures (if applicable) be presented in the subcontractor's work plan.

Comment: EPA recommends that the specific subcontractor qualifications and experience in handling known and unknown potentially hazardous wastes be defined in the document.

Response: We are in agreement with the EPA that the Request for Proposal should contain subcontractor qualifications and experience clauses. The appropriate clauses will be added to the document.

Comment: The EPA recommends that the specification require the successful bidder to identify the specific waste disposal facilities which will accept the containerized chemical waste, in the work plan phase.

Response: The specification will be modified to include provision for certification by the subcontractor that the waste disposal facilities meet the requirements when hazardous wastes are involved. The land disposal ban provision of RCRA will also be addressed as part of the subcontractor's work plan.

General

Comment: The EPA review states that there is one(1) deficiency common to the four proposals and that is that plans for onsite handling and storage of radioactive contaminated materials should be developed.

Response: Plans for onsite handling and storage of radioactive contaminated materials are currently being finalized and will be provided under separate cover.

4711

NOV 10 1987

Mr. David E. Bedan
Missouri Department of
Natural Resources
Post Office Box 176
Jefferson City, Missouri 65102

Dear Mr. Bedan:

MISSOURI DNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in Dr. Frederick A. Brunner's letter of October 26, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised and we intend to proceed with these actions in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: B. K. Biggs, USEPA
E. Brown, FLW
w/enclosure

FILE NUMBER: ____________

PEER:JCoyne:x41:mw:11/9/87: (c:DNRCom.Ltr.)

CONCURRENCES
RTG SYMBOL: PEER
INITIALS/SIG.: J. Coyne
DATE: 11/9/87
RTG SYMBOL: CE-541
INITIALS/SIG.: R. Nelso
DATE: 11/9/87
RTG SYMBOL
INITIALS/SIG.
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RTG SYMBOL
INITIALS/SIG.
DATE

DOE F 1325.10
(7-79)

OFFICIAL FILE COPY

RESPONSES TO MDNR COMMENTS
ON INITIAL FOUR (4) IRA PROPOSAL PACKAGES

I. Removal of Overhead Piping and Asbestos Removal

Comment: The DNR states that Missouri has adopted the Federal Clean Air Act standards for asbestos handling and has been delegated responsibility for implementing these standards and that asbestos and piping removal activities are subject to both the Missouri Air Conservation Law and the Missouri Solid Waste Management Law. DNR recommends that we maintain close contact with the Air Pollution Control Program to insure compliance with these standards.

Response: DNR Air Pollution Control Program office will be kept apprised of plans for asbestos removal work at the Weldon Spring Site. The WSSRAP will comply with requirements for disposal of asbestos and other demolition wastes in accordance with the Missouri Solid Waste Management Act.

Comment: The DNR has determined that the overhead piping and asbestos should be handled as a "special waste".

Response: We are proceeding to include the Special Waste Disposal Request form in the Request for Proposal for this work.

Comment: The DNR states that onsite handling of asbestos and other demolition waste may also be subject to Missouri Solid Waste Management Law requirements and requests that we furnish information on the size, design, location of the staging area and the amounts and methods of handling for the materials to be handled in the materials staging area.

Response: Information on handling and staging of the materials will be furnished to the DNR prior to issuing requests for proposals for this work.

modnrrsp,txtsheil

II. Disposal of Containerized Chemicals

Comment: Define specific levels at which the containerized wastes are considered radioactive.

Response: WSSRAP is developing concentration levels for wastes containing natural uranium for review and acceptance by concerned federal agencies. We will advise the DNR of this determination as it comes available. Until this determination is made we will retain on site containerized chemical materials which contain detectable levels of radioactive materials as determined by our onsite instruments.

Comment: What are removal plans for underground storage tanks on site?

Response: The underground tanks at the WSS have been sampled and found to contain only rainwater with trace amounts of motor fuel. The drainage and removal of the underground tanks is not part of the containerized chemical inventory and removal IRA Scope of Work. They may be removed as part of a subsequent IRA.

Comment: The document appears to be a generic outline for removal of waste. Items such as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. are not detailed.

Response: The IRA documentation represents a request for proposal to be sent to potential removal subcontractors. The responsibility for developing a detailed work plan addressing such items as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. rests with the successful bidder. A requirement of the subcontract specification is the development of the subcontractor's work plan which must be approved by the WSSRAP before the work may begin. The DNR will be provided a copy of the subcontractor work plan when it becomes available for review. The WSSRAP office requests that the State provide a timely review (14 calendar days) to avoid delaying the subcontractor's

efforts. The State will be given 2-weeks notice of the interval at which time the work plan will be available for review.

III. <u>Remedial Action on Army Vicinity Property</u>

Comment: DNR states that the interim measure suggested is lacking in detail and should contain information on:

- How the removal is to be conducted?
- How and where excavated material will be contained?
- Health and safety plans for the work.
- Why is DOE recommending only remedial action for this vicinity property?
- When does DOE plan to remove the additional contamination in the other six locations?

Response: The technical requirements, i.e. specifications, drawings, special conditions, etc., did not accompany this IRA package for review as they were incomplete at the time of package submittal. Requirements for removal, containment and storage, and health and safety plans will be included in the Request for Proposal for this work.

The very small quantity (less than two cubic yards) of contaminated material can be removed manually and will not require any significant mechanical equipment. The technical specification developed for this work will provide required direction to the subcontractor.

We plan to excavate and place the contaminated soil in 55 gallon drums. The drums will be sealed, placed and stored in a dry, concrete floored building at the Weldon Spring Site awaiting final disposition. Total volume is anticipated to be less than 5 drums.

No unusual hazards are anticipated for this activity. The contract will require workers to abide by the WSSRAP Environmental, Safety and Health Plan.

DOE proposes performing remedial action of Army Vicinity Property No. 7 to remove contamination from an area where the Army has imminent construction plans. Cleanup of other vicinity properties, containing larger volumes of contaminated material, will be recommended based upon urgency of cleanup needs and development of storage facilities on the WSS.

Remediation of the remaining Army Vicinity Properties is tentatively scheduled for the first and second quarters of fiscal 1989.

IV. Power Line/Pole Removal

Response: The plan should address PCB contamination in regard to pole removal if transformers/capacitors containing PCB's were mounted on them.

Comment: The power poles to be removed in the IRA were specifically not associated with transformers containing PCBs. Those poles which have oil-cooled transformers mounted on them will be surveyed and removed at a later date.

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE ARFS FILE # IR-0500

TABLE OF CONTENTS

The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-500-501

5/29/87

WELDON SPRING CHEMICAL PLANT

CONTAINERIZED WASTE ASSESSMENT

AND REMOVAL PLAN

DRAFT

PREPARED FOR

THE DEPARTMENT OF ENERGY

PREPARED BY:

WELDON SPRING SITE REMEDIAL ACTION PROJECT

MK-FERGUSON COMPANY

AND

JACOBS ENGINEERING GROUP INC.

CONTRACT NO. DE AC05-86OR21548

File: Weldon Spring
Subfile: RI/FS/EIS No 20.1
Label as: WSCP Containerized Waste Assessment and Removal Plan

CCWASTE

FILE NUMBER: ____________

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DRAFT

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Figure	Title	Page
1	Location of Weldon Spring Chemical Plant	
2	Major Structures at WSCP	
3	Containerized Chemical Inventory Form	
4	Condemned Fire Extinguisher Inventory Form	
5	Containerized Chemical Sampling Form	
6	Compatibility Testing Protocol	
7.	Containerized Chemical Contents Identification Form	

DRAFT

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DRAFT

DRAFT

1.0 INTRODUCTION

The Weldon Spring Site (WSS) is a U.S. Department of Energy (DOE) surplus facility located in St. Charles County, Missouri (Figure 1). The site presently consists of the Weldon Spring Raffinate Pits (WSRP), the Weldon Spring Quarry (WSQ), the Weldon Spring Chemical Plant (WSCP), and properties in the vicinities of these areas that have become contaminated as a result of operations at the WSS.

On October 1, 1986, the MK-Ferguson and Jacobs Engineering Team assumed responsibilities as Project Management Contractor (PMC) for the Weldon Spring Site Remedial Action Program (WSSRAP). The PMC for WSSRAP is also responsible for completion of characterization of the WSCP area.

The WSCP will be characterized to determine its physical properties and to determine the magnitude and distribution of chemical and radioactive contamination at the site. This information will play a key part in DOE's ultimate decision regarding decontamination and decommissioning of the WSS and disposition of its wastes.

1.1 Purpose

The purpose of this containerized waste assessment and removal program is to address the identification and disposal of containerized wastes that currently exists at the WSCP. This program is a necessary prerequisite to the overall implementation of the WSSRAP.

The intent of this program is two fold: 1) to mitigate the potential for sudden or unexpected release to the environment

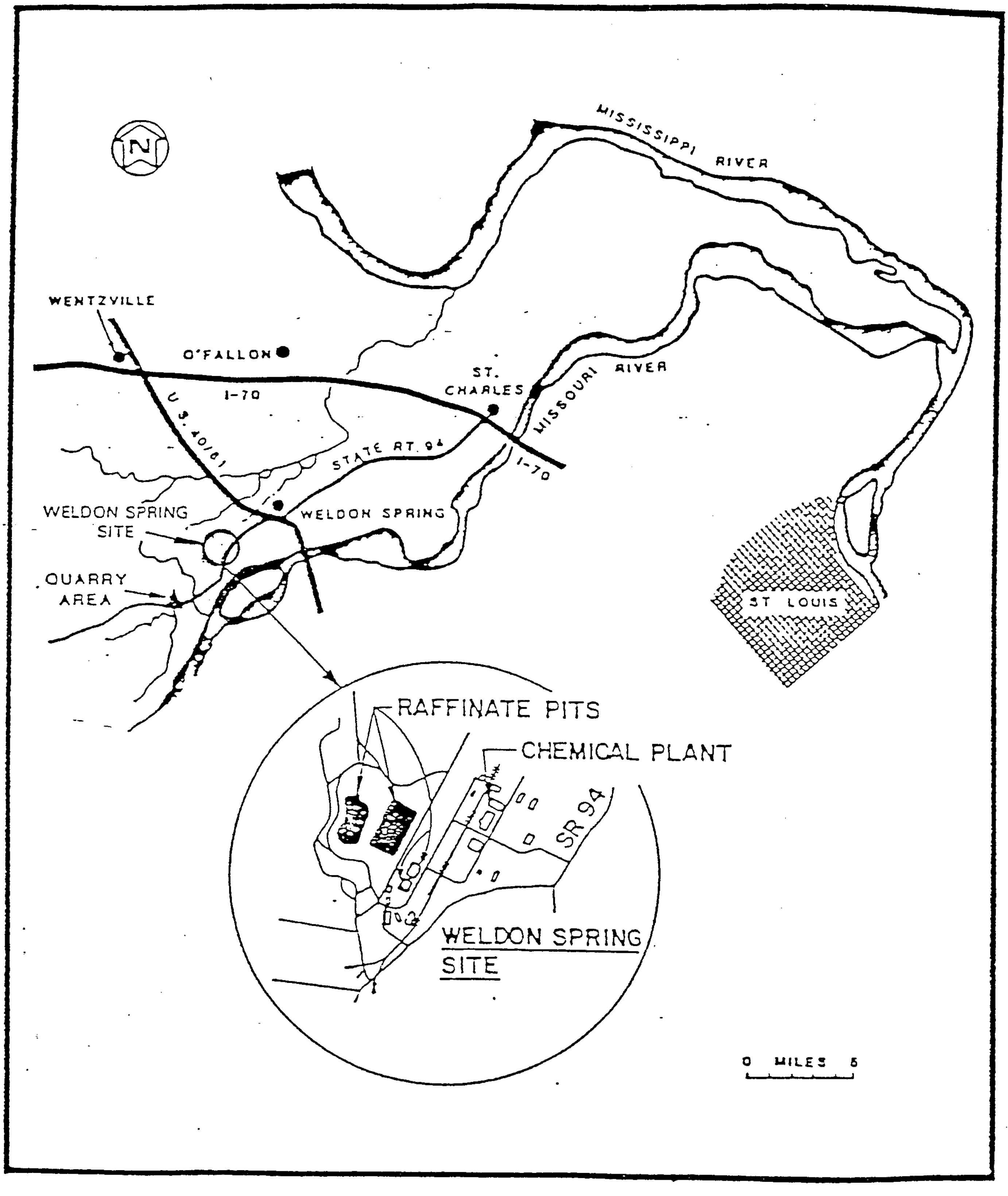

FIGURE 1 LOCATION OF WELDON SPRING CHEMICAL PLANT

DRAFT

resulting from improper container storage, continued container degradation, or increased site remedial activities which may increase the potential for such releases; and 2) to identify and remove those materials which create potential exposure risks to the health and safety of site personnel during subsequent WSSRAP activities.

1.2 Scope

The containerized waste assessment and removal program is focused on those materials remaining in containers. These materials include: liquids, solids, sediments and sludges currently contained in surface and subsurface storage tanks, process vessels, sumps, drums, fuel tanks, laboratory containers, gas cylinders, fire extinguishers, batteries and other miscellaneous containers.

All materials identified above will be designated as waste materials and will be considered a hazardous substance until such time as the preliminary characterization and/or individual container sampling preclude their classification as a hazardous substance as defined by 40 CFR 300.6 under the Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA), or a hazardous waste under 40 CFR 261 The Resource Conservation and Recover Act (RCRA).

Furthermore, those containerized wastes which are identified as having radiologic activity above background levels will be segregated and placed in an interim storage area onsite for treatment and disposal with other radiologically contaminated materials from the WSS.

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1.3 Objectives

The objective of this program is to inventory, identify, segregate, package, transport, and dispose of all non-radiologically contaminated hazardous wastes in an environmentally acceptable manner consistent with applicable federal, state and local regulations. This program has the further objective of determining which, if any, of the radiologically contaminated materials are also hazardous wastes under RCRA. The major factors which will be considered in determining the feasibility and effectiveness of various treatment/disposal options will be focused toward permanent alternatives consistent with EPA's proposed alternative treatment/disposal technology guidance for removal and expedited response actions (EPA, September 1986).

2.0 SITE DESCRIPTION

The WSCP includes 13 major buildings and approximately 30 smaller buildings. Of the 13 major buildings, five were used as process buildings, and eight were major support buildings. Most of the buildings are shown and identified in Figure 2. The other two buildings (4-35, 4-3) are just beyond the southern boundary of this Figure.

The WSCP site encompasses a portion of what was previously the Weldon Spring Ordnance Works (WSOW), used to manufacture DNT and TNT between 1941 and 1944. In 1956, the Atomic Energy Commission acquired approximately 220 acres of the original WSOW site from the Department of the Army (DA) for use as a uranium feed materials plant (DA, March 1976).

Following shutdown of the Feed Materials Plant in 1966, the AEC

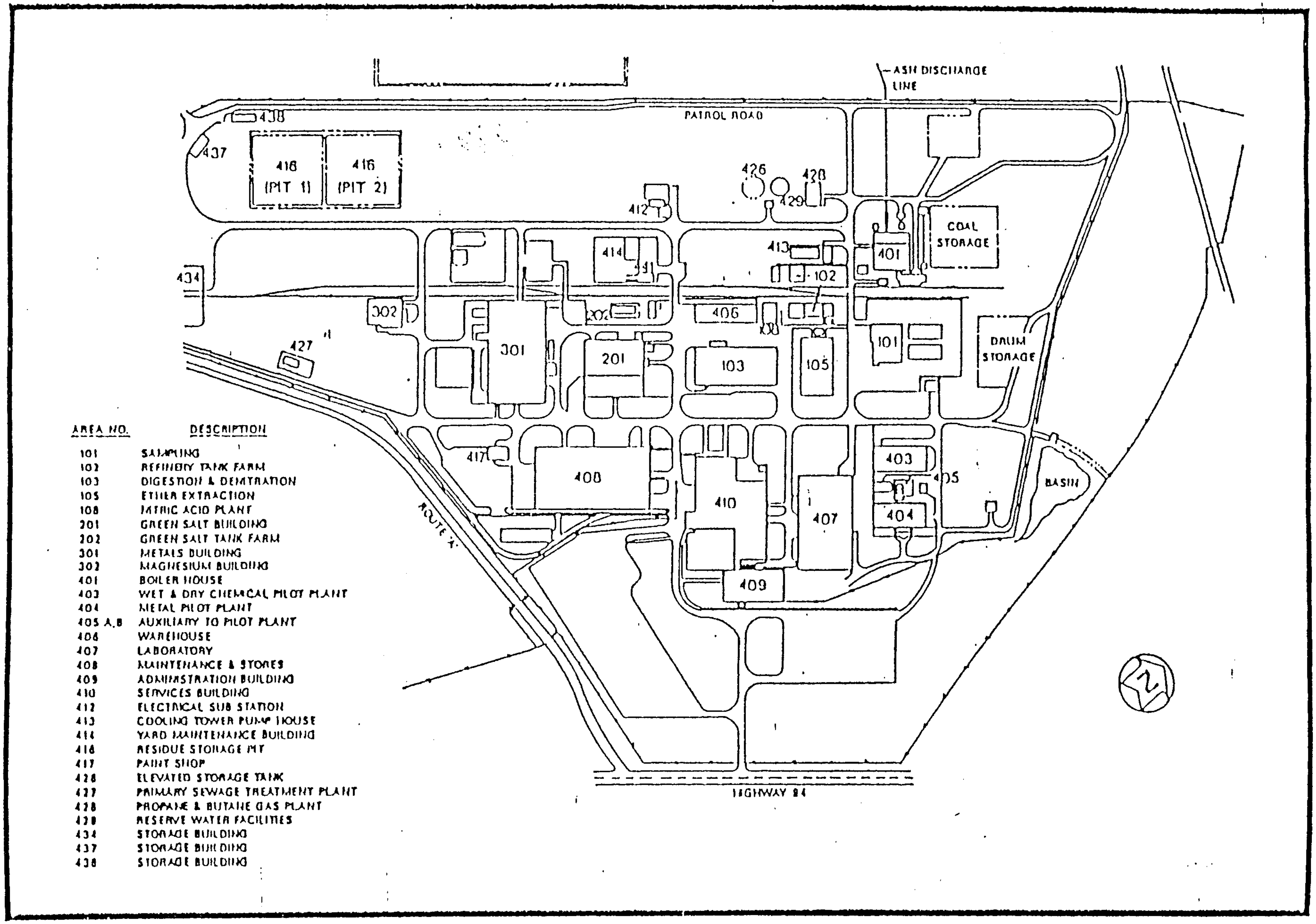

FIGURE 2 MAJOR STRUCTURES AT WSCP SITE

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transferred the facility to the DA for conversion to a defoliant production plant. The DA hauled approximately 6,000 cubic yards of radiologically contaminated materials to the WSQ and also dumped an undetermined amount of contaminated scrap material into Raffinate Pit 4 (DA, March 1976). Work on the defoliant project was canceled in 1969 before renovation of facilities was complete; therefore, herbicide was not produced at this site.

In 1983, the DA containerized the removable, radiologically-contaminated material from most of the buildings and appurtenant structures into 55 gallon drums these drums were placed in rows inside Building 301 and 406. The contaminated materials and machinery inside Building 301 were covered with a thin fabric and sprayed with a 1-inch-thick layer of hard-setting foam to prevent the spread of contamination as a result of rain leaking into the building (SNC, April 1984).

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3.0 TECHNICAL APPROACH

This containerized waste assessment and removal program will be performed in two phases. Phase I will involve two activities, container inventory and chemical characterization. These preliminary activities will be performed by the PMC. Information gathered in this first phase will be utilized to develop subcontractor bid specifications and other documents necessary to award a subcontract to perform Phase II activities. Phase II activities may include: site preparation for container staging, container staging, container sampling, waste bulking, manifest preparation and transportation/treatment/disposal of containerized materials.

All work performed under these activities will be subject to and controlled by DOE approved WSSRAP plans including:

- Environmental, Safety, and Health Plan for the Weldon Spring Site Remedial Action Project;
- Quality Assurance Program Plan for the Weldon Spring Site Remedial Action Project;
- Community Relations Plan for the Weldon Spring Site Remedial Actions Project;
- WSSRAP Spill Prevention, Control and Countermeasure Plan, and
- Applicable DOE Orders.

Activity specific operation plans and standard operating procedures will be developed and implemented by the PMC for the Phase I activities and by the removal subcontractor for Phase II activities to support the unique activities which will be performed during the container assessment and removal operations.

Details of each activity are presented in the following sections.

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3.1 PHASE I

Phase I will consist of container inventory and characterization steps.

3.1.1 Inventory of Containerized Chemical Waste

The container inventory will be the initial activity performed to identify and estimate the number, location, general condition, storage configuration, and sampling method required for WSCP containers. During the inventory, the indoor and surrounding area of each building will be surveyed for the presence of bottles, drums, tanks and other vessels. As containers are identified, their locations will be recorded on base maps. Additionally, each container, or group of containers, will be described on a container inventory form (Figures 3 and 4) as to the type of container(s), capacity, physical condition, markings, etc. and as to the type of material (liquid, solid, gas or sludge). Each container or group of containers will be assigned and labeled with a unique identifying number. When more than one identical container is present at one location, the entire group will be assigned a single number. Like containers will be physically grouped together and suitably labeled.

During the inventory, the potential hazards to on site personnel associated with the waste materials will be assessed using radiologic survey instruments, organic vapor survey meters, and combustible gas/oxygen meters.

3.1.2 Identification of Container Contents

Concurrent with inventory activities, efforts will be undertaken to identify the waste materials. Based on a site survey performed by PMC personnel in April 1987, approximately

FIGURE 3

Weldon Spring Site Remedial Action Project (WSSRAP)
Route 2, Highway 94 South, St. Charles, Missouri 63303
Phone (314) 441-8086 Telecopy (314) 447-0803

Containerized Chemical Inventory

Container Number: CC-2 -0587 Date: ____________

Number of Containers Included In This Number: ____________

LOCATION WHERE FOUND:

Building No.: ____________

Floor No.: ____________

Room Name/No.: ____________

____

Drawing No.: ____________

LOCATION MOVED TO:

Staging Area No.: ____________

Staging Area Name: ____________

____

CONTENTS IDENTIFICATION:

___ Definitely Known

___ Tentatively Known

___ Unknown

QUANTITY OF MATERIAL:

Gallons: ____________

Pounds: ____________

CONTAINER TYPE:

___ Drum - Open Top

___ Drum - Bung Top

___ Fiber Drum

___ Can - 5 gallon

___ Can - 1 gallon

___ Tank - Above Ground

___ Tank - Below Ground

___ High Pressure Tank

___ Gas Cylinder

___ Bag

___ Box

___ Sump

___ Pipe

___ Bottle

___ Jar

___ Other ____________

CONTAINER INTEGRITY:

___ Over-Pressurized ___ Leaking ___ Rusted Through

___ Other ____________

ORIGINAL LABEL WORDING:

____

____

____

PERSONNEL HAZARD LEVEL SURVEY DATA:

PID Reading: ____________ ppm calibrated to ____________

Oxygen Concentration: ____________ percent

Combustible Gas Level: ________ % of LEL calibrated to ________

Radiation Levels: alpha: ________ beta: ________ gamma: ________

Other: ____________

INVENTORIED BY:

Signature: ____________ Employer: Jacobs Engineering

Form CC-1

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two-thirds of the containers onsite are known to be labeled or the contents can be identified based on process drawings or knowledge of the process. Many of the containers are unopened and have intact labels. Appendix A lists the chemicals associated with processing activities that are potentially still present at the site.

During this identification step, all containers will be screened qualitatively in situ for radiologic activity. This screening will be performed using both alpha and beta/gamma radiation survey meters. The results of this screening will be used only to determine whether the material is grossly contaminated. It will not be used to determine whether materials are releasable offsite.

The contents of all containers determined to be radiologically contaminated during the above screening procedure will be sampled. These samples will be quantitatively analyzed onsite using gamma spectroscopy and offsite for RCRA characteristic testing. The radiologic activity will be determined onsite using one-hour counting times in the High Purity Germanium Gamma Spectroscopy System capable of detecting uranium-238, thorium-230 and radium-226. Other radioactive isotopes will not be measured since these materials are not present on site. The RCRA characteristics test will include EP-toxicity, ignitibility, reactivity, and corrosivity. These tests will be performed to determine whether the radioactive wastes from the site are also RCRA characteristic wastes.

A random sampling of approximately 10 percent of the remaining known and unknown materials which are not radiologically contaminated will be performed to confirm the label markings and physical appearance. The same quantitative tests for RCRA characteristics will be performed on those samples as were performed on the radiologically contaminated samples. Collection of samples for these various parameters will be documented on the form shown in Figure 5.

This characterization will allow gross categorization of the types of waste on-site. This information will be used to prepare bid specifications, cost estimates, and to estimate the level of effort for the remaining removal activities. Costs for the removal phase are extremely variable depending on waste types, required overpacking, recontainerization, potential for bulking, distance to an acceptable disposal site, and personnel protective equipment required for safe handling. This sampling will also expand the general knowledge of the WSCP and provide information needed for worker protection.

The appropriate sampling techniques will be determined by the types of material, and any physical constraints or limitations determined during the field assessments. Sampling methods and equipment will vary with the physical form and medium of the sample. In each case, the sampling and collection procedures will be consistent with those identified in EPA guidance and methodology documents (EPA, December 1984, May 1985, and January 1986).

After completion of the container inventory and characterization, the information will be summarized into a graphical, tabular, or matrix formats. This information will be utilized in the development of the subcontractor bid specifications for containerized waste removal and disposal addressed under the following activities.

3.2 Phase II

The second phase will be performed by the subcontractor who is

FIGURE 4

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Weldon Spring Site Remedial Action Project (WSSRAP)
Route 2, Highway 94 South, St. Charles, Missouri 63303
Phone (314) 441-8086 Telecopy (314) 447-0803

Condemned Fire Extinguisher Inventory

Building or Area Number ____________________

Floor ____________________

Type Of Extinguisher	Number (Hash Marks)	Total
Dry Chemical, Red (AB or ABC)		
10 pound		
30 pound		
350 pound (Wheeled)		
Other______________		
Dry Chemical, Yellow (for metal fires)		
30 pound		
150 pound (Wheeled)		
Other______________		
Carbon Dioxide		
5 pound		
10 pound		
15 pound		
20 pound		
Other______________		
Propellant Cartridge for Dry Chemical Extinguisher		
Ansul		
Other		
Other Types		
______________		
______________		

Inventoried By (Signature): ____________________

Date ____________________

Form CC-4

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FIGURE 5

Weldon Spring Site Remedial Action Project (WSSRAP)
Route 2, Highway 94 South, St. Charles, Missouri 63303
Phone (314) 441-8086 Telecopy (314) 447-0803

Containerized Chemical Sampling

Container Number: CC-2 -0587

PHYSICAL DESCRIPTION

____ Solid ____ Liquid ____ Sludge ____ Gas

____ Homogeneous ____ Stratified

Color: ______________________________

Viscosity: ______________________________

Other:

Described By: (Signature) ______________________________

Sample Type	Compatability	Radiologic	Chemical I.D.
Date Collected	________	________	________
Duplicate Collected	Yes or No	Yes or No	Yes or No
Separate Phases to Be Analyzed Separately	Yes or No	Yes or No	Yes or No
Collected By: Signature	________	________	________
Lab Receiving Sample	________	________	________

COMMENTS:

Form CC-2
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the successful bidder on that portion of the project. The bid specifications for Phase II will be prepared as part of Phase I.

3.1.1 Site Preparation

Before container removal actions begin, preparation of support facilities will be required to provide for safe and efficient handling of the containers. Based on the Phase I findings appropriate support facilities will be designated and/or installed by the removal subcontractor. The nature and extent of site preparation will vary depending on the hazard level of wastes, their locations, etc. The number and location of support facilities, special operating areas, or temporary storage areas needed for the removal operations may include:

- Staging areas,
- Drum opening area(s),
- Waste consolidation/loading areas,
- Interim storage areas,
- Equipment and personnel decontamination areas,
- Mobile laboratory,
- Command post and administration area,
- Emergency medical facilities, and
- Equipment maintenance area.

The site layout will be such that there is a safe travel distance between staging areas, opening/sampling areas, temporary storage areas, etc. Container inventory and characterization data gathered during Phase I will be used to determine the number and size of the various operating areas.

Highly hazardous containers such as those containing explosives, highly radioactive materials, pressurized drums, compressed gas cylinders, etc. may require separate staging/opening areas located as far as possible from the routine container handling operations and other site operations.

3.1.2 Staging

Any containers which were identified in the inventory and characterization activities which were leaking, badly corroded, or deformed will be overpacked or the contents transferred to a new or reconditioned container as soon as the removal subcontractor is on-site and site preparations are complete.

Once any immediate hazard(s) have been eliminated, removal activities will begin.

A container will not be moved or opened unless it has been ascertained beyond a reasonable doubt that the container is structurally sound, and the contents are not explosive or shock sensitive.

Staging of drums and other movable containers will be considered when the following conditions exist:

- Containers cannot be sampled in place due to physical restrictions,
- Potentially hazardous materials are stored together (i.e., storage of incompatible or reactive materials next to each other),
- There are severe access/egress restrictions,
- Drums can be grouped by waste type to facilitate bulking,
- Containers are pressurized, contain compressed gas, or exhibit unusual conditions.

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During staging, the containers will be physically separated into the following categories (when possible): liquids, solids, laboratory materials/packs, gas cylinders, and radioactive wastes.

The use of combined container staging/container opening areas, will be used when possible where container contents are known or suspected, (i.e., similar drum markings, labels, preliminary characterization indicate similar contents, etc.). Containers will be staged in rows of two or in groups of four, with sufficient distance between each row or group to provide easy access for drum opening equipment and adequate space for emergency evacuation.

3.1.3 Sampling for Compatibility and Disposal

A detailed work plan will be developed by the selected subcontractor and will be reviewed and approved in writing by the PMC prior to the start of on-site sampling activities. Generally, a typical plan for tank and drum sampling will address the following topics:

- Goals of the sampling effort,
- Use of sampling data (to select treatment or disposal options),
- Types of sampling to be performed (detailed drums laboratory container, gas cylinder sampling, detailed tank, vessel sampling, etc.),
- Sample analyses/compatibility testing,
- Methodology describing sampling and analytical procedures, and
- QA and safety.

The plan will be reviewed to ensure compliance with applicable

WSSRAP programs (See Section 3.0 - Technical Approach).

Container sampling activities, including sample collection, analysis, quality assurance and control, chain of custody, and documentation and reporting will be conducted in accordance with the guidelines set forth by the EPA in SW 846 (EPA, July 1982). In addition, the hazardous waste requirements established by the State of Missouri Department of Natural Resources (MODNR) and EPA Region VII will be implemented for these sampling activities.

Sampling of the drums and laboratory containers will be performed as the containers are opened in the staging area(s). Concurrent with the required analytical analysis, compatibility testing will be performed on-site to reduce turn-around time and increase staging/opening/bulking efficiency.

As each container is opened, the contents will be scanned for radioactivity. If activity levels are above background, one sample will be collected for radiologic identification and another collected for chemical analysis. After sampling, the container will be marked and removed to the designated radiological waste interim storage area. The final disposition of the radiologically contaminated wastes is not within the scope of this program. If activity levels equal background, a sample will be taken for compatibility testing.

Compatibility testing protocols, which have been developed by the Chemical Manufacturers Association (CMA, 1982), will be followed as outlined in Figure 6.

These compatibility testing procedures shown may require tailoring for site-specific containers at the WSCP or to meet the testing requirements of prospective treatment disposal facilities. A form similar to that shown in Figure 7 will be

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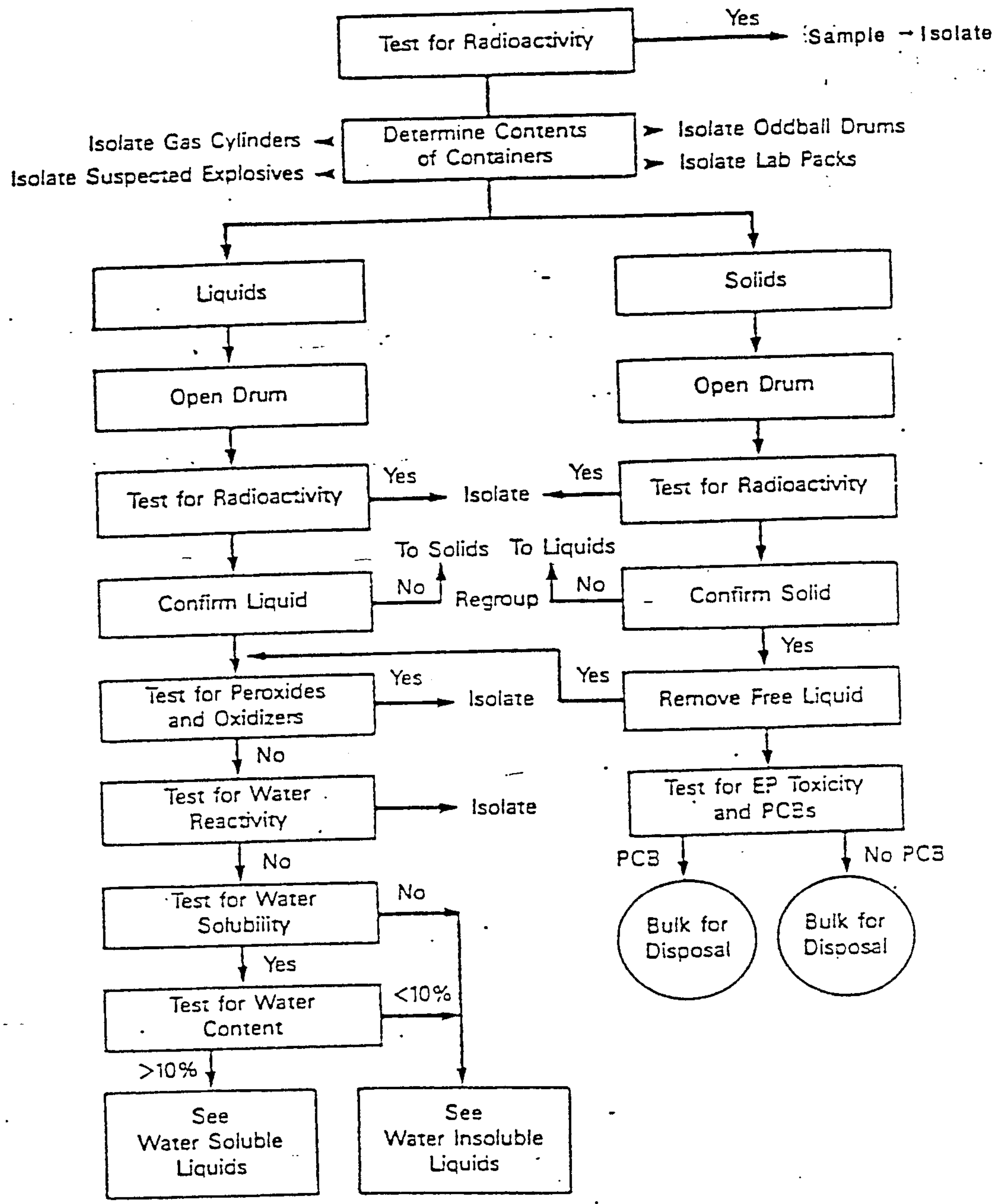

FIGURE 6 Compatibility Testing Protocol (Modified by Princeton Aqua -Science)
(Reprinted courtesy of Chemical Manufacturer's Association, Washington, D.C.)

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Water Insoluble Liquids Testing

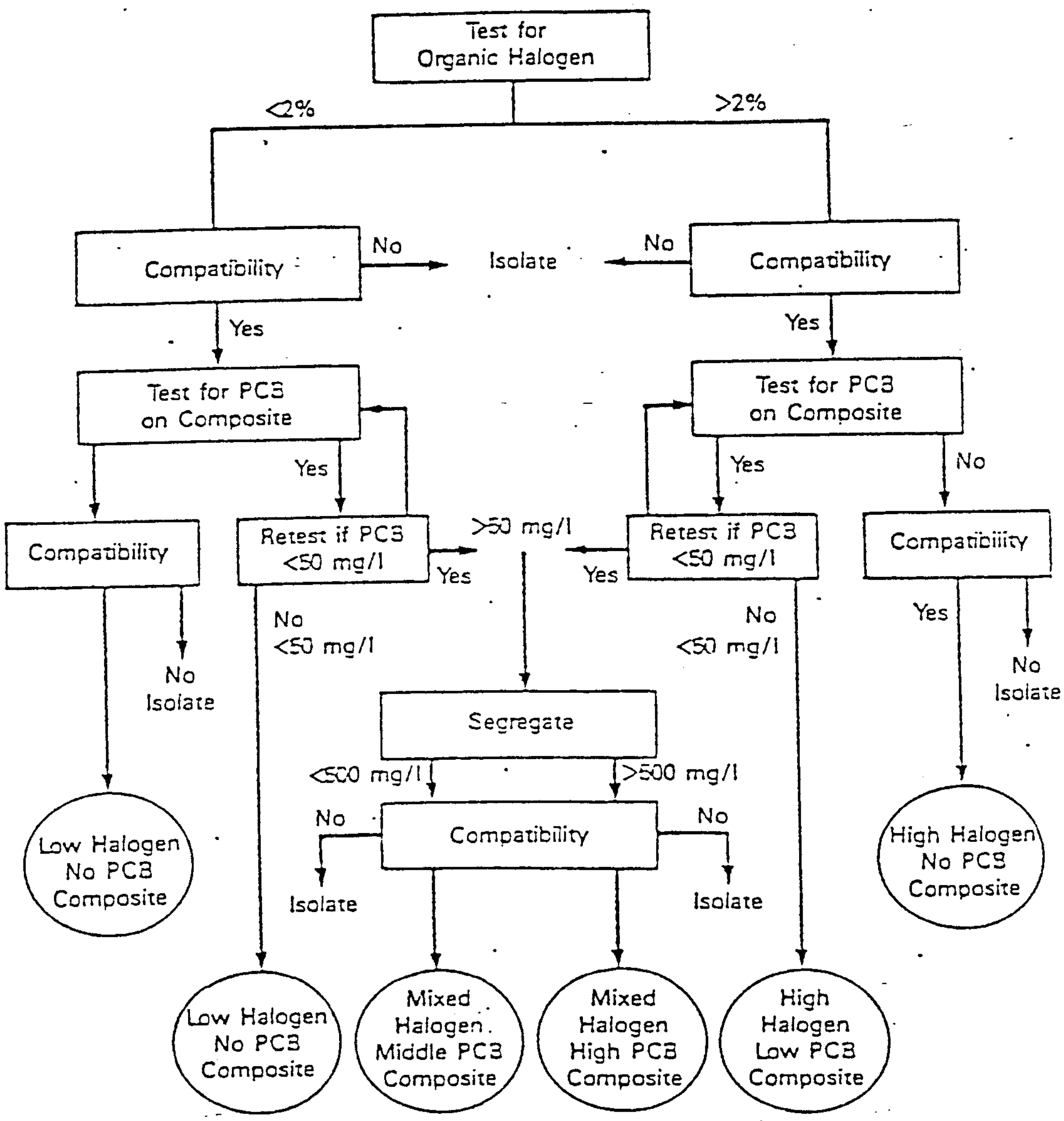

FIGURE 6 (continued) (Modified by Princeton Aqua Science). (Reprinted courtesy of Chemical Manufacturer's Association, Washington, D.C.)

Water Soluble Scan

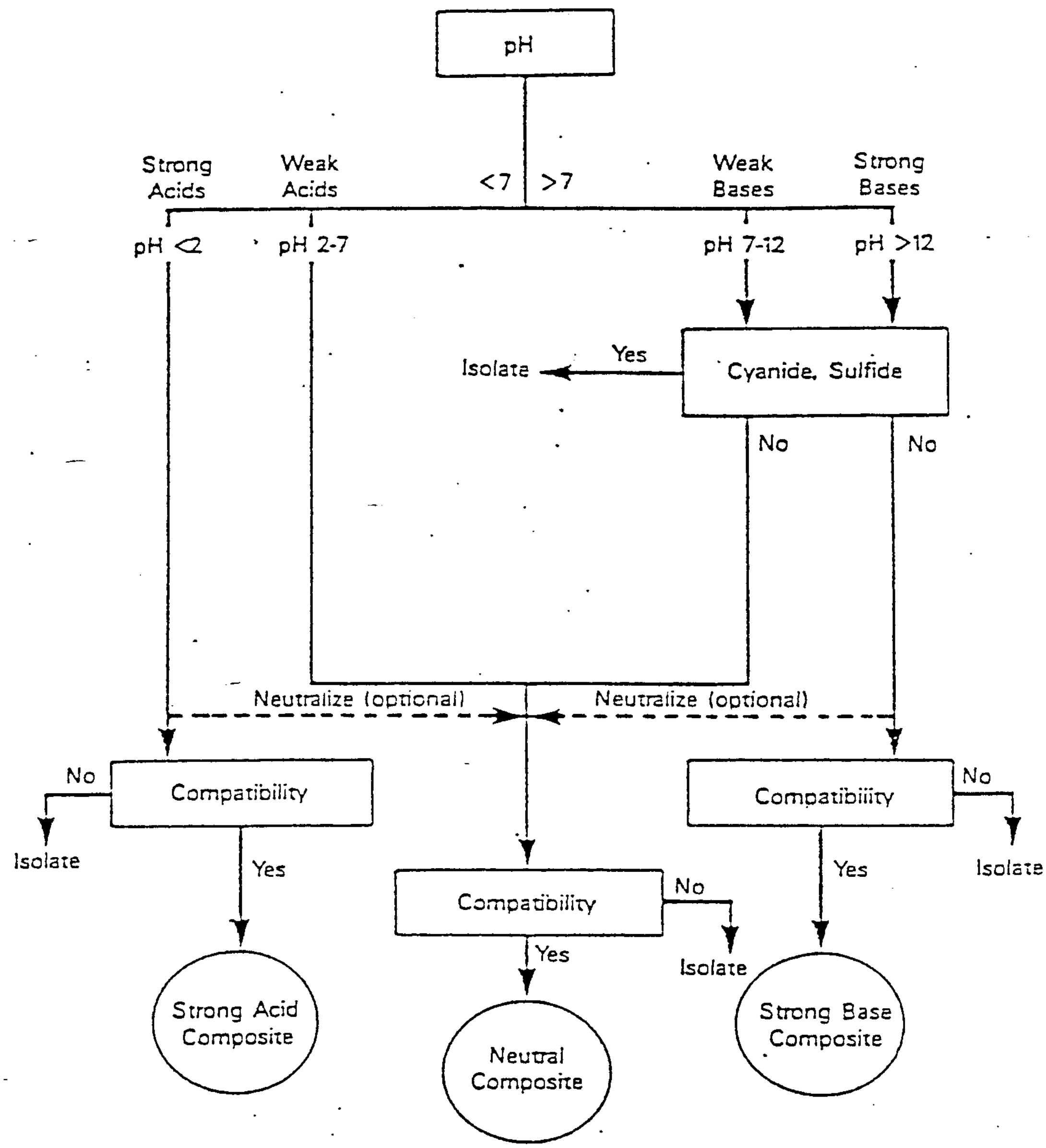

FIGURE 6 (continued) (Modified by Princeton Aqua Science) (Reprinted courtesy of Chemical Manufacturer's Association, Washington, D.C.)

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FIGURE 7

Weldon Spring Site Remedial Action Project (WSSRAP)
Route 2, Highway 94 South, St. Charles, Missouri 63303
Phone (314) 441-8086 Telecopy (314) 447-0803

CONTAINERIZED CHEMICAL CONTENTS IDENTIFICATION

Container Number CC-2 -0587

Radioactivity Level

Alpha	______	Uranium-Natural	______
Beta	______	Uranium-238	______
Gamma	______	Thorium-230	______
		Radium-226	______
		Others______	______
		______	______

Radiologically Releasable Off-Site: Yes or No

COMPATABILITY DATA

pH	______
Peroxide or Oxidizer	Yes or No
Reducing Agent	Yes or No
Water-Reactive	Yes or No
Halogen Content	Low or High
Acid	Strong, Weak, or No
Base	Strong, Weak, or No
Cyanides	Yes or No
Sulfides	Yes or No
Flammability	______
Specific Gravity	______
Heat Content	______ BTU/lb
Solids Content	______ percent
Hydrocarbon	Yes or No
Pesticides	Yes or No
Sulfur Content	Low or High
Phenols	Yes or No
Oil and Grease	______ percent
Water	______ percent
Viscosity	______
Organochlorine Content	______ percent
EP Toxicity Metals	Yes or No
Solubility	H_2O H_2SO_4 or $(CH_3)_2SO$

HAZARDOUS MATERIAL: Yes or No

Comments:

Lab Reports Transcribed By:(signature)______

Date:______

Form CC-3
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used to compile the results of these test.

Based on the CMA protocol, wastes may be segregated into the following broad waste categories:

- Liquids
  - Radioactive
  - Peroxides and oxidizing agents
  - Reducing agents
  - Water-reactive compounds

- Water insoluble
  - Low halogen, low PCB
  - Mixed halogen, high PCB
  - High halogen, low PCB

- Acids
  - Strong (pH <2)
  - Weak (pH 2-7)

- Bases
  - Strong (pH >12), with or without cyanides or sulfides
  - Weak (pH 7-12), with or without cyanides or sulfides

- Solids
  - Radioactive
  - Nonradioactive

The collection and analysis of samples from process equipment, tanks, vessels, sumps, and lines will require specialized access and sampling methodology. Because of their relative volume and quiescent condition, the contents will be stratified. It is anticipated that as many as three phases (oil, liquid, sludge) may be discovered and a sample from each will be collected to determine material characteristics, compatibility,and handling requirements.

Unique or special containers, such as gas cylinders, batteries, fire extinguishers, lab packs, over-pressurized drums, etc. will be handled on a case-by-case basis as these containers are found. Since a much higher level of risk is associated with the handling or disturbance of these containers, separate procedures will be developed for handling and removal of these materials.

3.1.4 Bulking

By identifying broad waste categories, compatible waste types can be safely combined into bulk containers on-site without risk of fire or explosion, and disposal options can be determined without exhaustive or costly analysis of individual drums.

Once a compatible group of samples is identified a final disposal analysis will be conducted. Analytical requirements of a number of disposal facilities have been compared (MBL, 1982). The tests identified in Table 1 are representative of tests that may be required prior to acceptance of liquids and solids for disposal.

3.1.5 Interim Storage

Liquid and solid wastes identified during the sampling which exhibit radiation levels statistically significant above background will be transferred into interim storage at the WSCP for later incorporation into treatment/disposal activities to be performed under the WSSRAP. The specific location of the WSCP interim storage facility will be determined by the PMC once the total volume of radiologically contaminated containerized wastes are determined.

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3.1.6 Treatment/Disposal

Once the containerized wastes have been categorized, they will be assigned appropriate treatment/disposal options. These options will be selected based on such factors as protection of public health, regulatory requirements, availability of treatment/disposal facilities, and applicability to site specific conditions (i.e., numbers of containers, volume of waste type(s), etc.).

A matrix, such as the one shown in Table 2, will be utilized to relate the type of containerized wastes to be handled from the WSCP to the types of waste treatment and disposal systems available. Only those treatment methods which have potential applicability to a given waste type and/or disposal categories (based on best engineering judgment) will be considered.

After the final treatment/disposal options have been determined, the wastes will be prepared to meet the requirements of the treatment or disposal facility and applicable Department of Transportation (DOT) shipping regulations.

Wastes will be removed and transported from the WSCP by the subcontractor to the designated treatment/disposal facility.

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TABLE 1

POTENTIAL ANALYTICAL REQUIREMENTS
FOR DISPOSAL *

1. Flammability
2. pH
3. Specific gravity
4. PCB analysis
5. Thermal content (BTU/lb)
6. Physical state at 70°F
7. Phases (layering in liquids)
8. Solids (%)
9. Hydrocarbon composition
10. Pesticide analysis
11. Sulfur content
12. Phenols
13. Oil and grease (%)
14. Water (%)
15. Viscosity
16. Organochlorine percentage
17. Metals analysis
    a. Liquids for soluble metals.
    b. Solids extracted according to the EPA Toxicant Extraction Procedure (24 hr.) which shows leachable metals.
    c. Both liquid and solids checked for concentrations of the following metals:

Arsenic	Mercury
Barium	Nickel
Cadmium	Selenium
Chromium	Silver

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TABLE 1 (continued)

Copper	Zinc
Lead	

18. Both free and total cyanide content.
19. Solids checked for solubility in water, sulfuric acid, and dimethyl sulfoxide.

---

* Reprinted from Muller, Broad, and Leo, 1982. Table originally printed in the Proceedings of the National Conference on Management of Uncontrolled hazardous Waste Sites, 1982. Available from Hazardous Materials Control Research Institute, 9300 Columbia Blvd., Silver Spring, MD 20910.

TABLE 2 CATEGORIES AND POTENTIAL TREATMENT/DISPOSAL TECHNOLOGIES

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TANK AND DRUM WASTE CATEGORIES	ON-SITE PREP ACTIVITIES: Bulking/Consolidation	ON-SITE PREP ACTIVITIES: Absorption/Solidification	ON-SITE PREP ACTIVITIES: Physical/Chemical Pretreatment	TREATMENT AND DISPOSAL: Solidification/Chemical Fixation	Detonation	Physical/Chemical Treatment	Biological Treatment	Land Application	Secure Landfill	Incineration/Thermal Reduction	Recycle/Reuse w/ Treatment	Recycle/Reuse w/o Treatment	Deep well Injection
AQUEOUS WASTES													
• Acid: pH < 2.0	1	2	1	2	2	1	2	2	2	2	1	1	1*
• Base: pH > 12.0	1	2	1	2	2	1	2	2	2	2	1	1	1*
• Base with Sulfur	1	2	1	2	2	1	2	2	2	2	2	2	2*
• Base with Cyanide	1	2	1	2	2	1	2	2	2	2	2	2	2*
ORGANIC LIQUIDS													
• High Halogen content (>2%)	1	2	2	2	2	2	2	2	2	1	2	2	2*
• Organic liquids including Low Halogen content (0-2%)	1	2	2	2	2	1	1	1	2	1	1	2	2*
• Oils ~~non-PCB~~ contaminated	1	2	2	2	2	1	1	1	2	1	1	1	2
• PCB Contaminated Liquid (50-500 ppm)	1	2	2	2	2	1	2	2	2	1	2	2	2
• PCB Contaminated Liquid (> 500 ppm)	1	2	2	2	2	1	2	2	2	1	2	2	2
CONTAMINATED WATER													
• 2 < pH < 12	1	2	1	2	2	1	2	2	2	2	2	2	1*
• Inorganic	1	2	1	2	2	1	2	2	2	2	2	2	1*
• Organic	1	2	1	2	2	1	1	1	2	2	2	2	1*
• PCB Contaminated Liquid (< 50 ppm)	1	2	2	2	2	1	2	2	2	1	2	2	2
• Pesticide	1	2	1	2	2	1	1	2	2	2	2	2	2
SLUDGE/SOLIDS													
• Organic Low Halogen	1	1	1	1	2	1	1	2	1	1	2	2	2
• Organic High Halogen	1	2	2	2	2	1	1	2	1	1	2	2	2
• Inorganic	1	1	1	1	2	1	2	2	1	2	2	2	2
• Flash point (<70° F)	2	2*	2	2	2	2	2	2	2	1	2	2	2
• Flash point (>70 - 140° F)	1	2	2	2	2	2	2	2	1*	1	2	2	2
• Flash point (> 140° F)	1	1	1	1	2	1	2	2	1	1	2	2	2
• PCB Contaminated Solid (<50 ppm)	1	1	2	2	2	1	1	1*	1	1	2	2	2
• PCB Contaminated Solid (>50 - 500 ppm)	1	2	2	2	2	2	1	2	1*	1	2	2	2
• PCB Contaminated Solid (> 500ppm)	1	2	2	2	2	2	1	2	1*	1	2	2	2
• Pesticide	1*	2	1	2	2	1	2	2	1	1	2	2	2
• Petroleum Residues	1	1	1	1	2	1	1	1	1	1	1	2	2
SPECIAL WASTES													
• Radioactive	*	*	*	*	*	*	*	*	*	*	*	*	*
• Strong Oxidizer	2	2	1	2	2	1	2	2	1	2	2	2	2
• Strong Reducer	1	2	1	2	2	1	2	2	1	2	2	2	2
• Lab Packs	2	2	2	2	1*	1	2	2	1	1	2	2	2
• Explosives	2	2	2	2	1	1	2	2	2	1	2	2	2

Phased waste shall be separated and handled as individual waste items

Mixed waste shall be classified under the more restrictive disposal category

1 = Reasonable Option

2 = Not Reasonable (Impractical, Technically Infeasible)

* = Further detailed analysis is warranted

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Chemical Manufacturers Association, Hazardous Waste Site Management Plan. Chemical Manufacturers Association, Washington, D.C., 1982.

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APPENDIX A

Chemicals Used at the Weldon Spring Feed Materials Plant

Building	Chemical Name	Reference	
All	CO2 Fire Extinguishers	D	S
All	Dry Powder Fire Extinguishers	D	S
All	Janitorical Chemicals		S
All	Soda Acid Fire Extinguishers	D	S
Most	Asphaltic Mastic Sealer	D	
Most	Asbestos Pipe Insulation		S
Many	Flaking Paint (May be Lead)		S
Many	Sumps	D	S
Overhead Utilities	Asbestos Pipe Insulation		S
Transformers	No-PCB Oil		S
Transformers	PCB Oil		S
101	Elevator Cable Cleaner		S
102	Hexane	D	
102	Nitric Acid	D	
102	Nitrogen	D	
102	Sodium Hydroxide	D	
102	Sulphuric Acid	D	
103 and 403	Alkali Wash	D	
103 and 403	Aluminum Solution	D	
103 and 403	ANN	D	
103 and 403	Calcium Oxide	D	
103 and 403	Condensate Water	D	
103 and 403	Deionized Water	D	
103 and 403	Dust Collector (Vacuum) Catch	D	
103 and 403	Filtrate	D	
103	Floor Wax		S
103 and 403	Fuel Gas	D	
103 and 403	Hydrostatic Precipitator	D	
103 and 403	Iron	D	
103 and 403	Lime Slurry	D	
103 and 403	Magnesium Oxide	D	
103 and 403	Misc. Metal	D	
103 and 403	Nitric Acid	D	
103 and 403	N. G. Liquor from Ether Ext.	D	
103 and 403	Orange Salt	D	
103 and 403	O.X. Liquors	D	
103 and 403	Raffinate	D	
103 and 403	Sawdust Converter Waste	D	
103 and 403	Scrap Metal	D	
103 and 403	Sodium Carbonate	D	
103 and 403	Sodium Hydroxide	D	
103 and 403	Sump Liquor (Bldg 103)	D	
103 and 403	U3O3	D	
103 and 403	UNH	D	
103 and 403	UO3	D	

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Chemicals Used at the Weldon Spring Feed Materials Plant

Building	Chemical Name	Reference	
103 and 403	Uranium Ore Concentrates	D	
103 and 403	Wash Water	D	
103 and 403	Water	D	
103 and 403	Wet Scrubber Waste	D	
105 and 403	Deionized Water	D	
105 and 403	Deionizer Chemicals	D	
105 and 403	Ether	D	
105 and 403	Ethylene Glycol	D	
105 and 403	Filter Press Waste	D	
105 and 403	Hexane	D	
105 and 403	Nitric Acid	D	
105 and 403	Raffinate	D	
105 and 403	Rubberized Mastic	D	
105 and 403	Sodium Carbonate	D	
105 and 403	Sodium Hydroxide	D	
105 and 403	Sump Liquor (Bldg 105)	D	
105 and 403	Tributyl Phosphate	D	
108	Ferric Nitrate	D	
108	Nitric Acid	D	
109	Compressed Gas Cylinders		S
201	Anhydrous Hydrogen Fluoride	D	
201	Ammonia	D	
201	Asbestos Cement Siding	D	S
201	Asbestos Insulation (on Tanks)		S
201	Azeo		S
201	Bottle of Clear Liquid		S
201	Condensate	D	
201	Drums of Unknown Chemicals		S
201	Dust Collector Catches	D	S
201	Elevator Cable Cleaner		S
201	Fibered Roofing Sealer		S
201	Green Salt	D	
201	Hydraulic Oil	D	
201	Hydrofluoric Acid	D	
201	Hydrogen Gas	D	
201	Lime Scrubbing System Waste	D	
201	Nitrogen Gas	D	
201	Orange Oxide	D	
201	Propane	D	
201	Reverter Off-Gas Waste (Rerun)	D	
201	Reverter Product	D	
202	Anyhdrous Hydrogen Fluoride	D	
202	Ammonia	D	
202	Asbestos Cement Siding	D	S
202	Hydrofluoric Acid	D	
301	Air Filter Catches	D	

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Chemicals Used at the Weldon Spring Feed Materials Plant

Building	Chemical Name	Reference
301	Asbestos Cement Siding	D S
301	Caustic Flake	D
301	Caustic Liquid	D
301	Condensate From Process	D
301	Dust Collector Catches	D
301	Green Salt	D
301	Magnesium	D
301	Metal Oxide (from Saws)	D
301	Precipitation Tank Sediment	D
301	Process Sewer Filter Cake	D
301	Salt Bath Supplies	D
301	Salt (Unknown Type)	D
301	Settling Tank Sediment	D
301	Slag	D
301	Uranium Metal	D
302	Magnesium	D S
302	Wet Scrubber Catch	D
302	Graphite Sheets	S
401	Acid	D
401	Asbestos (Bags)	S
401	Asbestos Cement Siding	D S
401	Asbestos Floor Tile (offices)	D
401	Asbestos Pipe Insulation	S
401	Ash	D
401	Batteries	S
401	Diesel	D
401	Fuel Oil	D
401	Gasoline	D
401	Hydrofluoric Acid	S
401	Hydrogen Zeolite--Water Softener	D
401	Lube Oil	D
401	Oil Sorber (for Air Compressor)	D
401	Phosphate	D
401	Refrigeration Brine	D
401	Salt	D
401	Sodium Zeolite -- Water Softener	D
401	Sulfite	D
401	Water Testing Chemicals	S
403	(See Buildings 103 and 105)	
404	Barium Fluoride	S
404	Degreaser Chemicals	D
404	Filter Cake	D
404	Graphite	S
404	Green Salt	D
404	Helium	D
404	Hydraulic Oil	D
404	Hydrogen	D
404	Lithium Fluoride	S

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Chemicals Used at the Weldon Spring Feed Materials Plant

Building	Chemical Name	Reference	
404	Slag	D	
404	Uranium Metal	D	
405	Dust Collector Catch	D	
406	Drum Storage	D	
406	Dry Chemical Storage	D	
406	Graphite Blocks		S
406	Waste from Feed Materials Plant In Drums filled During Army Decontamination Efforts		S
406	Lime		S
406	Sealers		S
407	Asbestos Cement Siding	D	S
407	Asbestos Pipe Insulation		S
407	Ether	D	
407	Hydrofluoric Acid	D	
407	Laboratory Chemicals	D	
407	Non-Sparking Floor (Ether Lab)	D	
407	Perchloric Acid	D	
407	Photograph Developing Chemicals	D	
408	Acetylene Cylinders	D	
408	Air Filters	D	
408	Anti Radioactivity Cleaner		S
408	Asbestos (Bags)		S
408	Asbestos Ceiling Board	D	
408	Asbestos Pipe Insulation		S
408	Batteries	D	
408	Carbide Tool Grinder Dust	D	
408	Carpentry Shop supplies	D	
408	Cleaning Solvent		S
408	Compressed Gas Cylinders		S
408	Decon Wastes	D	
408	Electrical Maintenance Supplies	D	
408	Gasoline	D	
408	Grease	D	S
408	Hydraulic Oil	D	S
408	Inert Gas (for Welding)	D	
408	Instrument Maintenance Supplies	D	
408	Insulating Supplies	D	S
408	Isopropyl Alcohol		S
408	Machine Shop Supplies	D	S
408	Millwright Supplies	D	
408	Nitric Acid	D	
408	Oil		S
408	Oxygen Cylinders	D	
408	Pipefitting Supplies	D	
408	Rigger's Supplies	D	
408	Sheet Metal Working Supplies	D	
408	Sodium Phosphate		S

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Chemicals Used at the Weldon Spring Feed Materials Plant

Building	Chemical Name	Reference
408	Thread Cutting Oils	D S
408	Welding Supplies	D S
408	Window Washing Supplies	D
409	Ammonia	S
409	Asbestos Pipe Insulation	S
409	Lead Wall Lining (Teletype Room)	S
409	Photograph Developer Chemicals	S
409	Printing Press Cleaner	S
409	Printing Press Inks	S
410	Asbestos Pipe Insulation	D S
410	Laundry Room Supplies	D S
410	Medical Clinic Supplies	D S
410	Medical Laboratory Chemicals	D S
410	Perchloric Acid	D
410	SCBA Oxygen Generation Canisters	D S
412	Batteries	D S
413	Chlorine	D
413	Chromate Phosphate	D
413	Sulphuric Acid	D
414	(Not Inspected)	
415	(None Found)	S
416	Raffinate Pits	D S
417	Asbestos Pipe Insulation	S
417	Flammable Materials	D S
417	Paint	S
417	Paint Solvents	S
426	Water Tower (Drinking Water for County)	
427	Sewage Sludge	D S
428	Propane	D
429	(County Water Company Building)	
430	(None Found)	S
431	(Not Inspected)	
432	(None Found)	S
433	Dehydrating Agents	S
433	Cement Mix	S
433	Drums of Unknown Contents	S

Chemicals Used at the Weldon Spring Feed Materials Plant

Building	Chemical Name	Reference
434	Drum of Unknown Contents	S
435	Batteries	S
435	Drum of Unknown Contents	S
435	Cryogenic Liquid Containers	S
435	Water Treatment Chemicals	S
436	Cans of Unknown Contents	S
437	Drums of Unknown Contents	S
438	Drums of Unknown Contents	S
438	Sodium Fluoride	S
438	Paints	S
438	Paint Solvents	S
439	(None Found)	S
441	Compressed Gas Cylinders	S
443	Drums of Unknown Contents	S
Ash Pond Area	Open Dump with Assorted Wastes	S

D = Drawings by Blaw-Knox of Plant As-Built.
S = Survey by PMC Personnel Confirmed Presence of Container or Chemical.
NOTE: This list is not exhaustive, other chemicals are present.

Source: WSSRAP, 1987.

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DOE/OR/21548-128
CONTRACT NO. DE-AC05-86OR21548

WASTE ANALYSIS PLAN

Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

AUGUST 1992

REV. 4

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

081192

MK-FERGUSON A MORRISON KNUDSEN COMPANY Weldon Spring Site Remedial Action Project Contract No. DE-AC05-86OR21548	Rev. No. 4
PLAN TITLE: Waste Analysis Plan	

APPROVALS

Compliance Manager — Date: 8/17/92

Quality Assurance Manager — Date: 08/18/92

Deputy Project Director — Date: 8/18/92

Project Director — Date: 8/18/92

Project Manager — Date:

DOE/OR/21548-128

Weldon Spring Site Remedial Action Project

Waste Analysis Plan

August 1992

Revision 4

Prepared by

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and
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1 INTRODUCTION

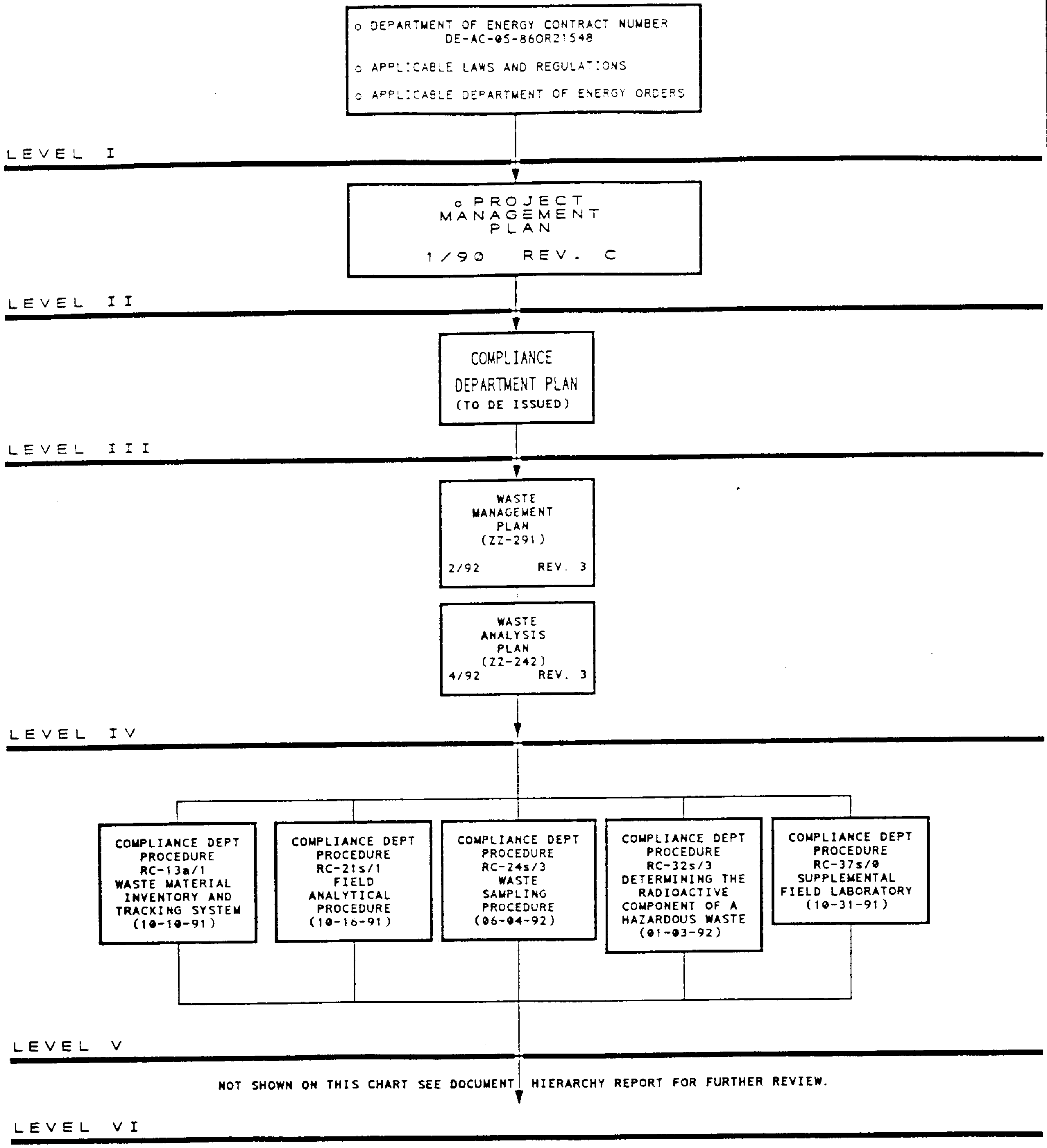
This *Waste Analysis Plan* has been designed to address chemical and radiochemical characterization requirements for management of wastes encountered at the Weldon Spring site, (WSS) Weldon Spring, Missouri. At a minimum, this plan will provide the means to obtain information necessary to classify, treat, store, or dispose of these wastes. The *Waste Analysis Plan*, which is designated as level IV in the Compliance Department document hierarchy (Figure 1-1), supports the Weldon Spring Site Remedial Action Project (WSSRAP) *Waste Management Plan* (MKF and JEG 1992a) and provides guidance to Waste Management personnel in the preparation of detailed sampling and analysis plans.

1.1 Background

Under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the site is required to comply with the applicable substantive requirements of the Resource Conservation and Recovery Act (RCRA) regulations. The requirements for long-term storage of hazardous waste are found in Title 40 of the Code of Federal Regulations, Part 264, which pertains to operation of Department of Energy Technical Service Division hazardous waste facilities. These regulations require detailed chemical and physical analysis of a representative sample of each waste.

The key elements of this *Waste Analysis Plan*, which are consistent with the General Facility Standards contained in 40 CFR 264.13(b)(1-3), specify:

- The appropriate sampling method for obtaining a representative sample of the waste for analysis.
- The parameters for which each waste will be analyzed, and the rationale for the selection of those parameters.
- The appropriate test methods required for these parameters.



WASTE ANALYSIS PLAN DOCUMENT HIERARCHY

FIGURE 1-1

REPORT NO.: DOE/OR/21548-128		EXHIBIT NO.: A/PI/134/0892	
ORIGINATOR: LDP	DRAWN BY: GLN	DATE: 8/92	

1.2 Purpose

The purpose of this *Waste Analysis Plan* is to accomplish the following three objectives:

1. Characterization for compatibility and proper container selection prior to bulking and recontainerization of unknowns.

2. Identification of those wastes that are subjected to the storage and disposal requirements of RCRA and/or the Toxic Substances Control Act.

3. Recharacterization of site generated wastes to detect any changes in the concentrations of chemical constituents, the appearance of new constituents, or variations in physical properties.

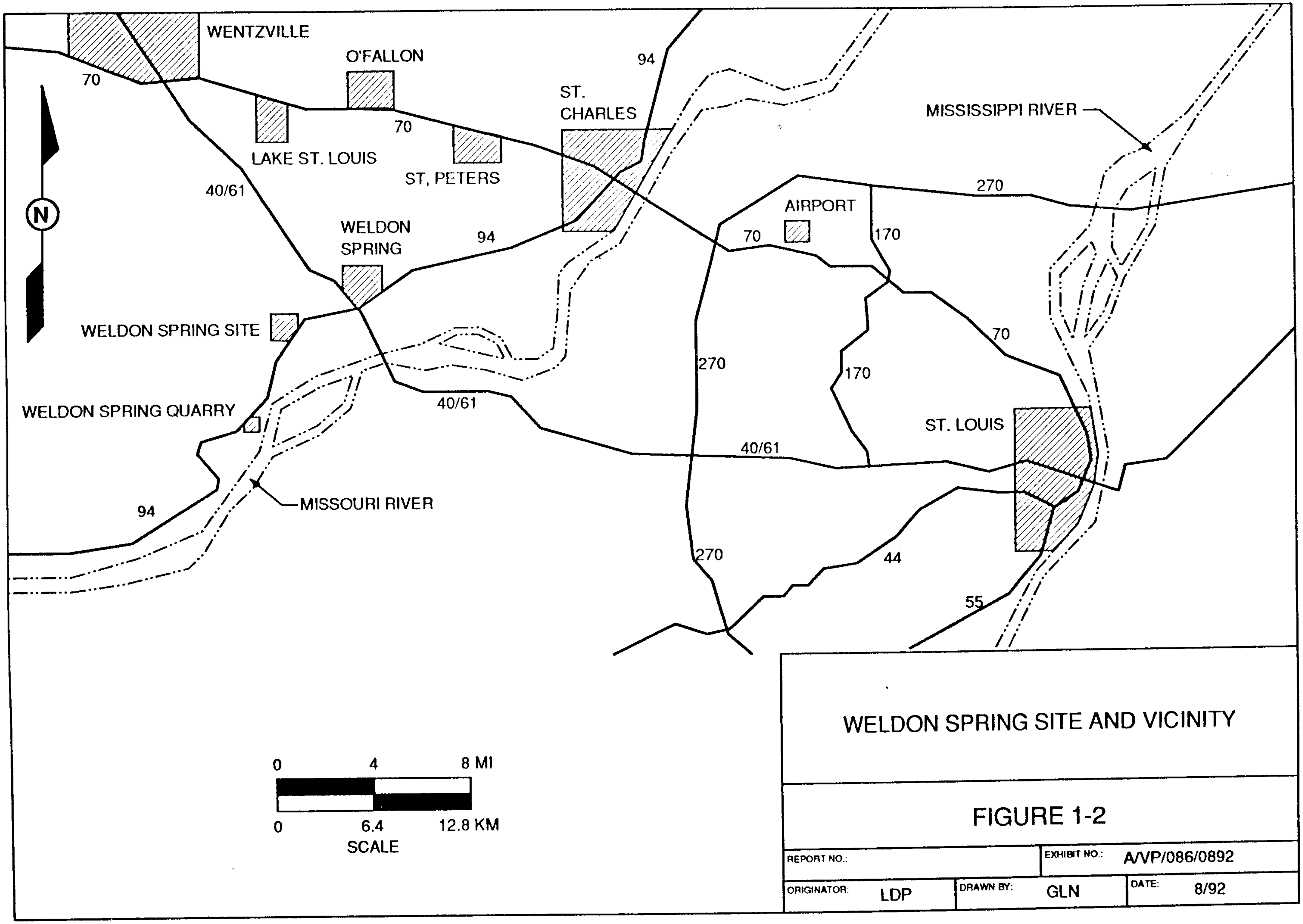
1.3 Scope

The plan is tailored to the requirements of the Weldon Spring Site Remedial Action Project in its effort to manage and ultimately dispose of hazardous and mixed wastes at the Weldon Spring site. Since the WSS is an inactive facility and a broad array of chemical wastes have been left at this site, this plan is generic in nature. It considers chemical and radiological analyses required for mixed waste characterization, interim storage, and disposal.

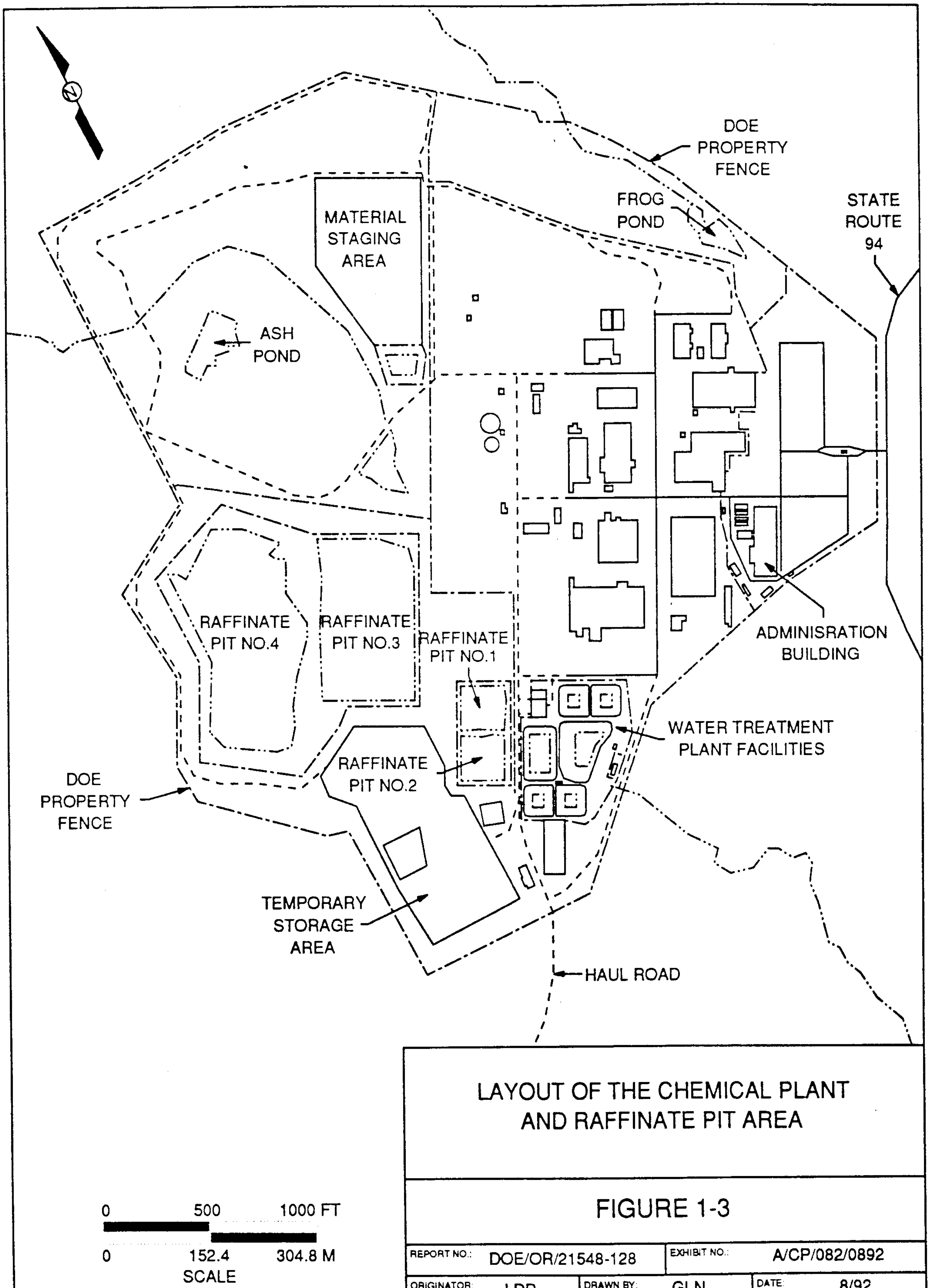
1.4 Site Description and Location

The Weldon Spring site (Figure 1-2) is located approximately 30 mi west of St. Louis in western St. Charles County, Missouri. St. Charles, the largest city in St. Charles County, is located approximately 15 mi northeast of the site. The site is bordered by large tracts of land owned by the Federal Government and the State of Missouri.

The WSS is divided into two distinct areas; one includes the raffinate pits and the chemical plant (Figure 1-3), which encompass 51 acres and 166 acres respectively, and the other is the quarry (Figure 1-4) which is located about 4 mi south-southwest of the raffinate pit/chemical plant area. These areas are located on Missouri Highway 94 southwest of the junction of U.S. Highway 40 (also known as Interstate 64 or U.S. Highway 61) and Missouri Highway 94.



WELDON SPRING SITE AND VICINITY					
FIGURE 1-2					
REPORT NO.:			EXHIBIT NO.:	A/VP/086/0892	
ORIGINATOR:	LDP	DRAWN BY:	GLN	DATE:	8/92

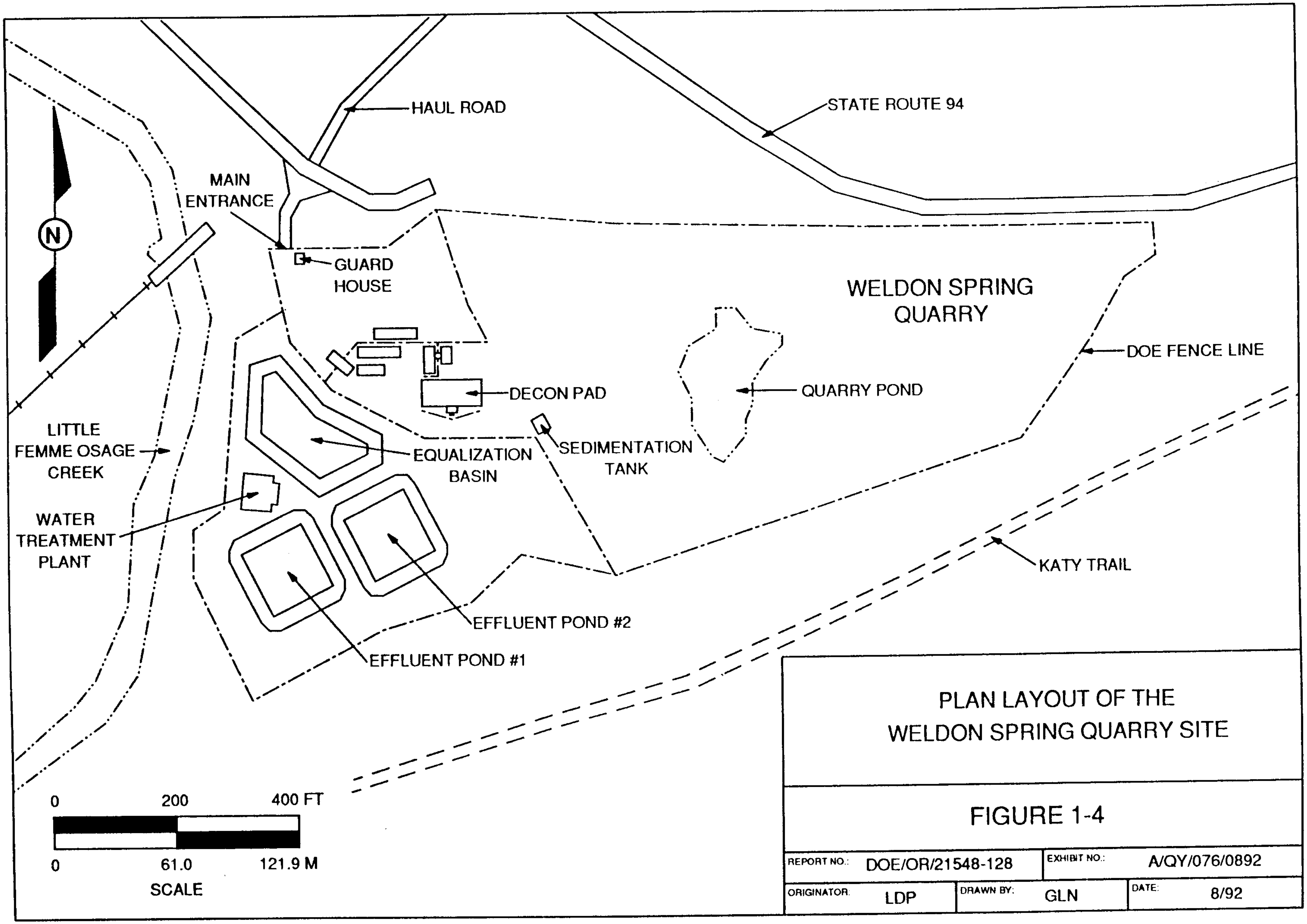


LAYOUT OF THE CHEMICAL PLANT
AND RAFFINATE PIT AREA

FIGURE 1-3

REPORT NO.:	DOE/OR/21548-128	EXHIBIT NO.:	A/CP/082/0892

ORIGINATOR:	LDP	DRAWN BY:	GLN	DATE:	8/92



PLAN LAYOUT OF THE WELDON SPRING QUARRY SITE

FIGURE 1-4

REPORT NO.: DOE/OR/21548-128		EXHIBIT NO.: A/QY/076/0892
ORIGINATOR: LDP	DRAWN BY: GLN	DATE: 8/92

The raffinate pit area contains four surface impoundments (raffinate pits) which contain wastes primarily from uranium and thorium processing and cover approximately 26 acres. The chemical plant consists of 13 major buildings, approximately 30 support structures, and the Ash Pond and Frog Pond areas. Ash Pond and Frog Pond are the two surface water bodies within the chemical plant area. Frog Pond is a surface impoundment near the northwest edge of the site.

The quarry is located in limestone and covers about 9 acres. The deepest part of the quarry is filled with water covering about 0.5 acres and is the only surface water body within this controlled area. A major source of potable groundwater in this area is the county well field located about 1 mi southeast of the quarry in the Missouri River alluvium.

1.5 Site History

From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring ordnance works (WSOW), constructed on the land that is now the WSS, for production of trinitrotoluene (TNT) and dinitrotoluene (DNT). The Army used the quarry for disposal of rubble contaminated with TNT. In the mid 1950s, 205 acres of the ordnance works property was transferred to the U.S. Atomic Energy Commission (AEC). This is now the raffinate pits and chemical plant area. An additional 15 acres was later transferred to the AEC for expansion of waste storage capacity. From 1957 to 1966, the AEC operated a uranium-processing facility at the Weldon Spring Uranium Feed Materials Plant, which subsequently became the Weldon Spring Chemical Plant (WSCP). Ore concentrates and some scrap metal were processed at the plant. Products that included uranium metal were shipped to other sites. Thorium-containing materials were processed on an intermittent basis. Radioactive raffinates from the processing were placed in four on-site pits. Other radioactive wastes were disposed of in the quarry.

After closure by the AEC, the chemical plant was reacquired by the Army in 1967. The Army partially decontaminated several buildings, dismantled some of the equipment, and began converting the facilities to produce herbicides. In 1969, prior to becoming operational, the herbicide project was canceled prior to bulk quantities of production chemicals being brought on site. As successor to the AEC, the U.S. Department of Energy (DOE) assumed responsibility for the raffinate pits. In 1984, the Army repaired several of the buildings at the chemical plant, decontaminated some of the floors, walls, and ceilings, and isolated some contaminated equipment.

In May 1985, the DOE designated the control and decontamination of the WSS as a Major Project (this project has since been designated as a Major System Acquisition). In October 1985, custody of the chemical plant was transferred to the DOE. A Project Management Contractor (PMC) for the Weldon Spring Site Remedial Action Project (WSSRAP) was selected in February 1986, and a DOE project office was established on the site in July 1986. The Project Management Contractor, MK-Ferguson Company, assumed control of the WSS on October 1, 1986.

On October 15, 1985, the U.S. Environmental Protection Agency (EPA) proposed to include the quarry on the National Priorities List (NPL). This listing occurred on July 30, 1987. On June 24, 1988, the EPA proposed to expand this designation to include the raffinate pits and chemical plant area. On March 30, 1989, these areas were also included in the listing and resulted in a single designation as the WSS.

1.6 Overview of Site Contamination

The WSS is contaminated with radioactive materials, nitroaromatics, heavy metals, asbestos, and various organic compounds. Contamination has been detected in various media groups including surface water, groundwater, soil, sludge, structures, and equipment. Asbestos has been found throughout the site buildings in the form of transite siding and insulation. Most of the asbestos is radiologically contaminated. Contamination in the vicinity of the WSS is located mainly along ditches, drainageways, and roads; some of the nearby ponds and lakes also contain elevated concentrations of certain contaminates.

Raffinate Pits 1, 2, and 3 contain raffinate sludge and slag resulting from the refining of uranium ore concentrates and the recycling of scrap metal at the chemical plant. In addition to this type of slag and sludge, Pit 4 contains wastes from the processing of thorium-containing materials and drums and rubble from the partial decontamination of the chemical plant. The pits contain approximately 168,200 m^3 (220,000 cy) of wastes. Thorium-230 is the predominant radionuclide in the pit wastes.

The chemical plant consisted of 43 buildings and miscellaneous structures. The actual processing of radioactive materials occurred in only a small number of these buildings. However, contamination has been confirmed in most of the non-process buildings and external areas as well. The spread of contamination most likely occurred as a result of (1) routine plant operations (e.g., tracking of contaminants from process areas and temporary relocation of contaminated equipment for repair), (2) processing support activities (e.g., waste handling), and (3) surficial deposition of airborne particulates. Some contamination also may have occurred subsequent to plant closure as a result of relocation of some contaminated equipment from process buildings into non-process buildings during earlier cleanup activities, and from transport of contaminated material by environmental factors (e.g., wind) and local biota (e.g., wasps).

Numerous smaller containers of miscellaneous wastes were left in various locations about the chemical plant. These containers were collected, consolidated (where appropriate), and containerized and placed into storage.

The quarry was used intermittently for disposal of chemically and radioactively contaminated materials from the early 1940s to 1968. The radioactively contaminated materials are those associated with uranium and thorium processing activities previously carried out at the chemical plant and at other sites in the St. Louis area. The chemical contaminants include polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and nitroaromatics. There are approximately 72,600 m^3 (95,000 cy) of contaminated wastes in the quarry. These wastes are in the form of rubble, soil, equipment, structural steel, and sludges. In addition to uranium, elevated concentrations of several metals including arsenic, copper, lead, and nickel have been detected.

Table 1-1 illustrates the wide variety of chemicals that has been used at the WSS.

1.7 Facility Description

Building 434 is currently used for storage of drummed waste at the WSS. This building, which was formerly used as a storage structure, was cleaned and refitted to RCRA and Toxic Substances Control Act (TSCA) standards. The defective concrete was removed and the floor was cleaned with a High Efficiency Particulate Air (HEPA) vacuum and washed with a tri-sodium phosphate solution. It was then etched with a 15% hydrochloric acid solution which was subsequently neutralized with a weak ammonium hydroxide solution and flushed with water.

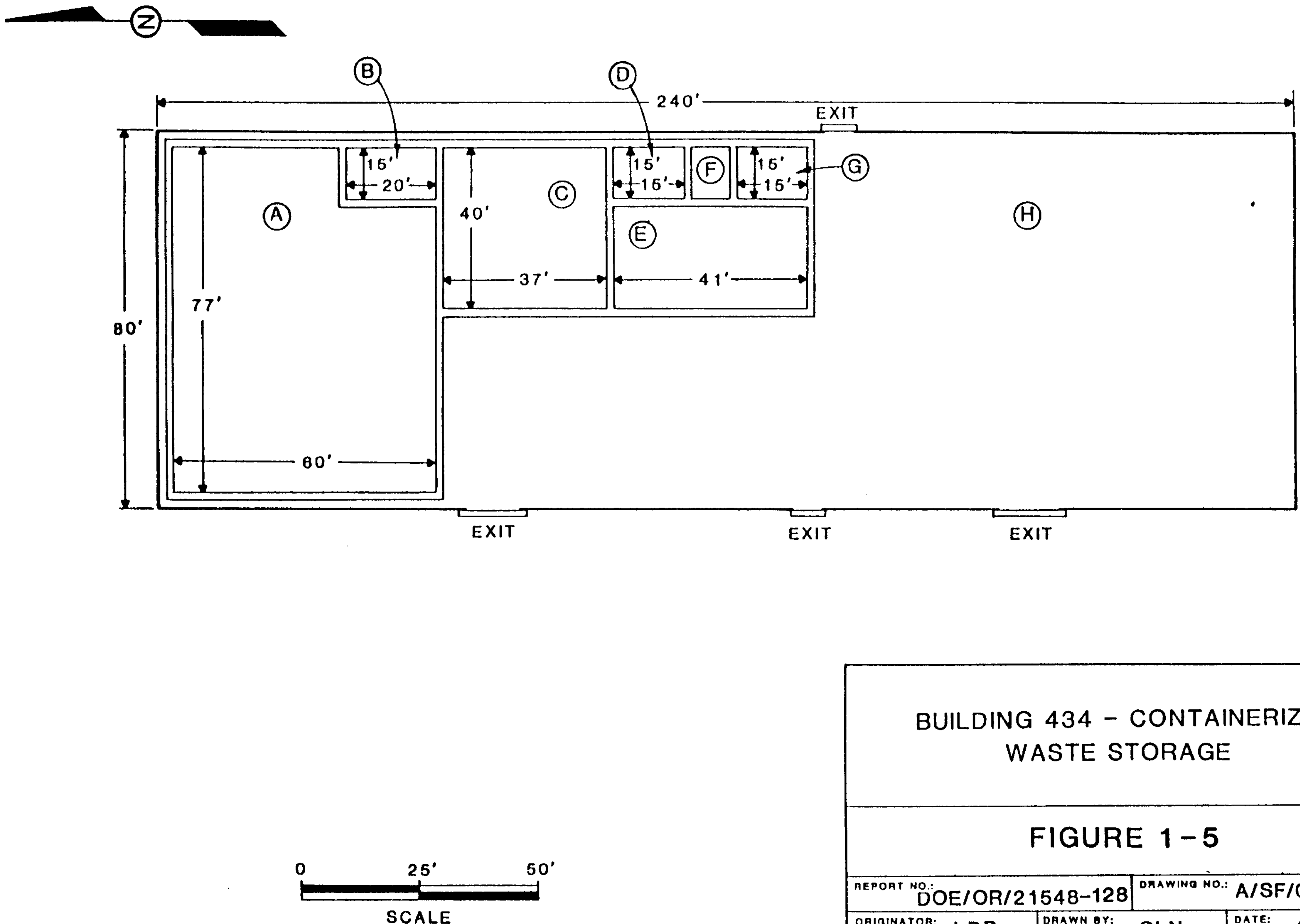
All joints and cracks were sealed utilizing a polyurethane sealant. An epoxy coating with slip resistant granules was applied to the floor after the installation of curbing for secondary containment for liquids (see Figure 1-5).

TABLE 1-1 Chemicals Used at Former Explosives Production Facility and Uranium Feed Materials Processing Plant

TNT, DNT Production (chemicals used at site)	
Ammonia	Oleum (sulfuric acid)
Caustic soda	Toluene
Fuel oil	Nitric Acid
	Sellite (sodium sulfite)

Uranium Processing	
Nitric acid	Sodium zeolite
Sodium hydroxide	Sulfite
Sulfuric acid	Helium
Sodium carbonate	Hydraulic oil
Phosphate	Uranium metal
UNH (uranium amine)	Laboratory chemicals
UO_3 (uranyl oxide)	Perchloric acid
Uranium ore concentrate	Grease
Lime	Chlorine
Ether	Chromium phosphates
Ethylene glycol	Acid (misc.)
Tributyl phosphate	Benzene
Ferric nitrate	Corrosive resistant coating
Paint and catalysts	Epoxy paint and catalysts
Anhydrous hydrogen	Unspecified flammable materials
Ammonia	Hot die lube
Green salt (uranium tetrafluoride	Linseed oil (boiled)
Hydrofluoric acid	Lubriplate
Hydrogen gas	Melcolene
Nitrogen gas	Metalube
Orange oxide (uranium oxide orange)	Methylene glycol
Propane	Methylisobutyl ketone
Caustic liquid	Motor oil
Magnesium	Paint
Graphite sheets	Paint solvents
Diesel fuel	Phenoline thinner
Fuel oil	Polyclad
Gasoline	Polyurethane paint
Hydrogen zeolite	Rustbound primer
Refrigeration brine	Tar

Source: (MKF and JEG 1988; reproduced from JEG 1989).



BUILDING 434 - CONTAINERIZED WASTE STORAGE

FIGURE 1-5

REPORT NO.: DOE/OR/21548-128		DRAWING NO.: A/SF/004/1090	
ORIGINATOR: LDP	DRAWN BY: GLN	DATE: 10/90	

Lighting is provided by lights suspended from the roof support structure with service provided by 240 volt panelboards located inside the structure.

An acrylic/aliphatic urethane resin coating designed for seamless encapsulation was applied to the roof of the structure to prevent leakage. Three secondary containment areas were created within the building by constructing 6 in. x 6 in. concrete berms. Four smaller containment areas were constructed within these areas by securing 4 in. x 0.25 in. angle iron to the floor. These containment areas are designed to provide secondary containment in accordance with both RCRA and TSCA requirements.

1.8 Overview of Waste Characterization

For the purpose of characterization, there are seven general categories of waste that require different laboratory sample preparation and analytical procedures present at the Weldon Spring site. The manner in which the wastes are to be grouped is dependent on chemical composition and the waste disposal or treatment technology to be utilized.

Aqueous liquid wastes which are considered inorganic can be acids, bases, solutions containing toxic metals and/or organics, or solutions containing reactive cyanide or sulfides. These wastes are candidates for chemical treatment or incineration.

Non-aqueous liquid (NAL) wastes, which include chlorinated and non-chlorinated solvents, fuels, and organophosphorus liquids such as tributyl phosphate, are candidates for incineration. The majority of the NALs are radioactively contaminated to the extent that commercial incineration scenarios are not feasible. Thus, the analytical and physical characterization requirements specified in the *Waste Acceptance Plan for the K-1435 Toxic Substance Control Act (TSCA) Resource Conservation and Recovery Act (RCRA) Incinerator* (DOE 1986) should be met for organic liquid wastes. Table 1 of the K-1435 *Waste Acceptance Plan* has been included as Appendix A to this *Waste Analysis Plan.*

Oils and paints, although they are NALs, are treated as a separate category for the purposes of waste analysis. Untreated wastes classified as oils and paints are not viable land disposal candidates due to the amount of free liquids, toxic metals such as chromium and lead, and land-disposal-restricted organics (LDR) in these wastes which precludes land disposal. Although the amount of heavy metals typically present in paint-related materials make this type of waste a marginal incineration candidate, oils and paints destined for off-site disposal are to be analyzed according to the requirements for incineration.

As a generic category, non-soil solids (NSS) include both inorganic and organic materials. Inorganic NSS materials may be inorganic salts or metals. It is possible that these wastes are characteristically hazardous due to elevated levels of toxic characteristic leaching procedure (TCLP) metals, cyanide or sulfide levels in excess of regulatory guidelines or water reactivity.

Organic NSS materials include organic chemicals in crystalline or powdered form (as well as wood and plastics). It is possible that some of these materials are "listed substances" or contain "listed substances". The presence or absence of any such "listed substance" must be determined to allow proper management of these wastes. These wastes may also be considered hazardous if they contain in excess of the regulatory limits of any TCLP constituent listed in 40 CFR 261.24.

Soils and solids include materials such as soil, sand, roofing material, concrete, and dust collected in vacuum cleaner bags. During site activities, a variety of chemically contaminated soils will be encountered which will require characterization to ensure proper management. Demolition activities will also result in a variety of wastes that will require characterization.

Site generated wastes are those wastes generated at the Weldon Spring site through on-site laboratory support activities, vehicle maintenance, personal protective equipment usage, and monitoring activities. In many cases, the chemical make-up of the waste will be known or can be approximated through knowledge of the generation process and will allow these materials to be placed in one of the above mentioned categories.

The final general category of wastes is of unknown liquids and solids. These are unknowns which are primarily small quantities of laboratory reagents and commercial products, or those materials contained in sumps or tanks which have not been characterized or consolidated. The consolidation of unknowns will not occur. Only after proper identification and subsequent reclassification into one of the other classes will materials be consolidated.

The field analytical requirements of each category are shown in Table 1-2 and the detailed laboratory analytical requirements are shown in Table 1-3. Each analysis must be

TABLE 1-2 Field Waste Analysis for Generic Waste Types

Parameter	Aqueous Liquids	Non-Aqueous Liquids	Oils & Paints	Inorganic Non-Soil Solids	Organic Non-Soil Solids	Soils & Solids	Unknowns[a]
Visual inspection	X	X	X	X	X	X	X
Surface radiological survey	X	X	X	X	X	X	X
pH	X			X		b	b
Redox	X	X		X	X	b	X
Solution-reactivity	X	X	X	X	X	b	X
Flame test	X	X	X	X	X	b	X
Sodium fusion		X			X	b	c
Ferrox		X			X	b	c
Hydrocarbon functionality		X			X	b	c
Oxygen functional group		X			X	b	c
Nitrogen functional group		X			X	b	c
Sulfur functional group		X			X	b	c
PCB screen			X			b	c
Flashpoint		X	X			b	c
Field compatibility	X	X	X	X	X	b	X
Fingerprint screening						b	
Inorganic functional group	X			X		b	c

a Unknowns are materials, which based on visual inspection and surface radiological scan, cannot be classified into any other class until sufficient field analyses are completed to allow reclassification.

b These tests will be performed based on the judgement of the Waste Management Group. Manager or his designee on a case-by-case basis.

c These tests will be performed once it has been determined that the waste can be classified in another generic class that is amenable to the indicated analysis.

TABLE 1-3 Laboratory Waste Analysis for Generic Waste Types

Parameter	Aqueous Liquids	Non-Aqueous Liquids	Oils & Paints	Inorganic Non-Soil Solids	Organic Non-Soil Solids	Soils & Solids	Unknowns[a]
Suspended solids	X		X				a
Total metals	X	X	X	X		X	a
Volatile organics		X	X			X	a
Semi-volatile organics		X	X			X	a
Moisture content		X	X	X	X	X	a
Specific gravity	X	X	X				a
Ash content	X	X	X	X	X	X	a
Flash point		X	X				a
Corrositivity	X	X	X			X	a
Heating value		X	X		X	X	a
Reactivity	X	X	X	X	X	X	a
Total organic halides	X					X	a
Total organic carbons	X		X			X	a
Paint filter test		X	X	X	X	X	a
Radiological characterization	X	X	X	X	X	X	a
Viscosity		X	X			X	a
PCBs		X	X		X	X	a
Dioxins and furans		X			X		a
Oil and grease	X					X	a

TABLE 1-3 Laboratory Waste Analysis for Generic Waste Types (Continued)

Parameter	Aqueous Liquids	Non-Aqueous Liquids	Oils & Paints	Inorganic Non-Soil Solids	Organic Non-Soil Solids	Soils & Solids	Unknowns[a]
Suspended solids	X		X				a
Sulfur	X	X					a
Chlorine	X	X	X	X	X		a
Phosphorus	X	X	X	X	X		a
Bromine	X	X	X	X	X		a
Fluoride	X	X	X	X	X	X	a
TCLP metals	X	X	X	X	X	X	a
TCLP pesticides	X	X			X	X	a
TCLP herbicides	X	X			X	X	a
TCLP volatiles (ZHE)	X	X	X	X	X	X	a
TCLP semi-volatiles	X	X	X	X	X	X	a
Asbestos				X	X	X	a
Polyaromatic hydrocarbons	X				X	X	a
Nitroaromatics	X				X	X	a

a Analysis to be performed after consolidation into one of the remaining groups tailored to the specific waste; however, the choice of analytical parameters can generally be limited to those indicated in the table. The appropriate method for each parameter is shown in Table 1-4.

Wastes that can be categorized or determined to be nonhazardous based on original container labels do not require analysis for chemical characterization.

TABLE 1-4 Method Reference

Laboratory Parameter	Method Reference
Suspended solids	EPA 1601
Total metals	SW 6010, SW 7XXX[a]
TCL volatiles	EPA CLP
Volatile organics	SW 8240
BTEX	SW 8020
Semi-volatile organics	SW 8270
Moisture contents	ASTM D1533 or ASTM D2216
Specific gravity	ASTM 3142 or ASTM C854
Ash content	ATM D482 or ASTM D3174
Flash point	SW 1010
Heating value (BTU)	ASTM D3286 or ASTM D240 or SW 5050
Corrositivity	SW 1110 or SW 9045
Elemental analysis/anions	
1. Sulfur	ASTM D129 or ASTM D3286/EPA 3000
2. Phosphorus	EPA 36528
3. Fluorine	ASTM D3761 or ASTM D3286/EPA 3000
4. Chlorine	SW 9251, ASTM D2361 or ASTM D3286/EPA 3000
5. Sulfate	SW 9036/EPA 3000
6. Nitrate	SW 9200/EPA 3000
Reactivity (cyanide and sulfide)	SW 7332 and SW 7341
TCLP	Extraction SW 1311
1. Metals	Digestion: SW 3010 Analysis: SW 6010
2. Pesticides	Extraction: SW 3510 Analysis SW 8080
3. Herbicides	Extraction: EPA 615 Analysis EPA 615
4. Volatile organics	Analysis 8240
5. Semi-volatile organics	Extraction 3510 Analysis 8270
Total organic halides (TOX)	SW 9020
Total organic carbon (TOC)	SW 9060
Paint filter test	SW 9095

TABLE 1-4 Method Reference (Continued)

Laboratory Parameter	Method Reference
Suspended solids	EPA 1601
Radiological characterization	
1. Total uranium	EPA 520/5-84-006[b] Method 00-05
2. Th-230	EPA 520/5-84-006[b] Method 00-05
3. Th-232	EPA 520/5-84-006[b] Method 00-05
4. Gross alpha and beta	SW 9310
Viscosity	ASTM D445
PCBs	SW 8080
Oil and grease/TPH	EPA 4131 SW 9073
Dioxins and furans	SW 8280
Asbestos	EPA 600/M4-82-020
Polyaromatic hydrocarbons	SW 8310
Nitroaromatics	SW 8330

a 7000 Series Methods (Atomic Absorption Methods)
b Eastern Envrionmental Radiation Facility Radiochemistry Procedure Manual, August 1984

2 QUALITY ASSURANCE AND QUALITY CONTROL

Weldon Spring site (WSS) detailed laboratory data must be legally defensible and valid. This requirement must be understood, planned, and provided for to ensure that adequate quality control is maintained. The project quality assurance (QA) organization is detailed in procedure QAPP-1 and the *Environmental Quality Assurance Program Plan* (EQAPP) (MKF and JEG 1991c).

2.1 Data Quality Objectives

Due to the wide variety of waste types, information sought, and end use of the data from waste analysis, no single set of data quality objectives (DQOs) can be established. DQOs are developed during the planning stages for each waste management sampling activity.

Since the Weldon Spring Chemical Plant is not an active facility, and because of documentation regarding the generation process of these wastes and waste management practices common to industry at the time of plant shutdown, many wastes at the WSS require detailed characterization to determine their regulatory status. Additionally, due to the extent of known radioactive contamination present on site, all wastes are characterized to determine if such contamination is present.

There are basically five reasons for collecting samples at the Weldon Spring Site Remedial Action Project (WSSRAP). Samples may be collected solely for the purpose of subjecting them to qualitative field analyses. These analyses are designed to provide gross chemical characterization information; determine the extent and appropriateness of detailed laboratory analyses; and aid in determining shipping classification and packaging, marking, and labeling requirements for transportation purposes.

Semiquantitative field analyses are performed on various samples collected at the WSSRAP. These analyses determine crude concentration levels to support the decision making process for various projects such as liner leak detection, well tracer studies, and water treatment plant equipment settings.

Quantitative or detailed laboratory analyses are performed to provide precise and accurate data regarding the characteristics of given wastes to determine proper regulatory classification, appropriateness of various treatment or disposal options, and to satisfy the analytical requirements of any treatment, storage, or disposal facility (TSDF) that may accept wastes from the WSS. Additionally, prior to releasing any waste material from the radioactive materials management areas (RMMA) of the WSS, wastes must be sampled and subjected to detailed radiological analyses as detailed in procedure RC-32. This procedure is used to verify that waste materials meet the requirements of DOE 5400.5, *Radiation Protection of the Public and Environment*, as well as the WSS off-site release policy.

Lastly, waste materials proposed for consolidation must be sampled and verified to be compatible by two waste management engineers (WME). This action is necessary to minimize the potential for adverse reactions and unnecessary chemical or radiological exposures.

Accuracy and precision must be determined and assessed through the use of quality control samples including distilled water blanks, trip blanks, equipment blanks, field duplicates, matrix spikes, and matrix spike duplicates. Table 2-1 documents the frequency that these samples must be collected and the DQOs routinely applied. It must be noted that the DQOs are intended for guidance only. DQOs specific to a sampling activity may vary slightly and should be documented in the sampling and analyses plan for that activity.

Distilled water blanks are used to monitor the purity of the distilled used to prepare preserving reagents, trip blanks, and equipment blanks. These samples will be collected quarterly from the distilled water reservoir.

Trip blanks document volatile organic contamination attributable to shipping and field handling procedures. Trip blanks must be collected prior to entering the field to perform any sampling activity. Trip blanks are collected by filling the vial directly from the distilled water reservoir, transporting the vials unopened to the sampling site, and then shipping unopened to the laboratory. A trip blank is required each day for each sampling activity where samples are collected for volatile organic analysis.

Equipment blanks are useful in documenting adequate decontamination of reusable sampling equipment. They are collected after completion of decontamination, and prior to sampling, by collecting a sample of the media used to rinse the sampling equipment.

TABLE 2-1 QA Sample Frequency and Data Quality Objectives for Waste Analysis

	Distilled Water Blank		Trip Blank		Equipment Blank		Matrix Spike & Matrix Spike Duplicate		Field Duplicate	
Analyte	Frequency	Criteria	Frequency	Criteria	Frequency	Criteria	Frequency	Criteria	Frequency	Criteria
Volatile organics	1/QTR	---	1/Event	a	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Semi-volatile organics	NA	---	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Pesticides/PCBs; herbicides	NA	---	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Nitroaromatics	NA	---	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Polyaromatic hydrocarbons	NA	---	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Dioxins and furans	NA	---	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Oil and grease/TPH	NA	---	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	<20% RPD
Total organic carbon	1/QTR	<1ppm	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	<25% RPD
Total organic halides	1/QTR	All CMPD<DL	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	<25% RPD
Metals	1/QTR	All CMPD<DL	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Cl, SO_4, F, NO_3, PO_4	1/QTR	All CMPD<DL	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Total U, Th-228, 230, 232	1/QTR	All CMPD<DL	NA	---	1/Event	a	1/20 or 1/batch	b	1/20 or 1/batch	b
Heating value (BTU)	NA	---	NA	---	1/Event	a	NA	---	1/20 or 1/batch	<20% RPD
Flash point	NA	---	NA	---	1/Event	a	NA	---	1/20 or 1/batch	<20% RPD
Ash content	NA	---	NA	---	1/Event	a	NA	---	1/20 or 1/batch	<20% RPD
Suspended solids	1/QTR	<DL	NA	---	1/Event	a	NA	---	1/20 or 1/batch	<20% RPD
Specific gravity/viscosity	NA	---	NA	---	1/Event	a	NA	---	1/20 or 1/batch	<20% RPD
Swipes	NA	---	NA	---	1/Event	a	NA	---	1/20 or 1/batch	<50% RPD

a No higher than the highest of the following: All compounds <DL; All compounds <0.05 Regulatory Threshold; All compounds <0.05 Sample Concentration

b Evaluated on a case-by-case basis.

Field duplicates are independent samples that are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These samples are useful in documenting the precision of the sampling process.

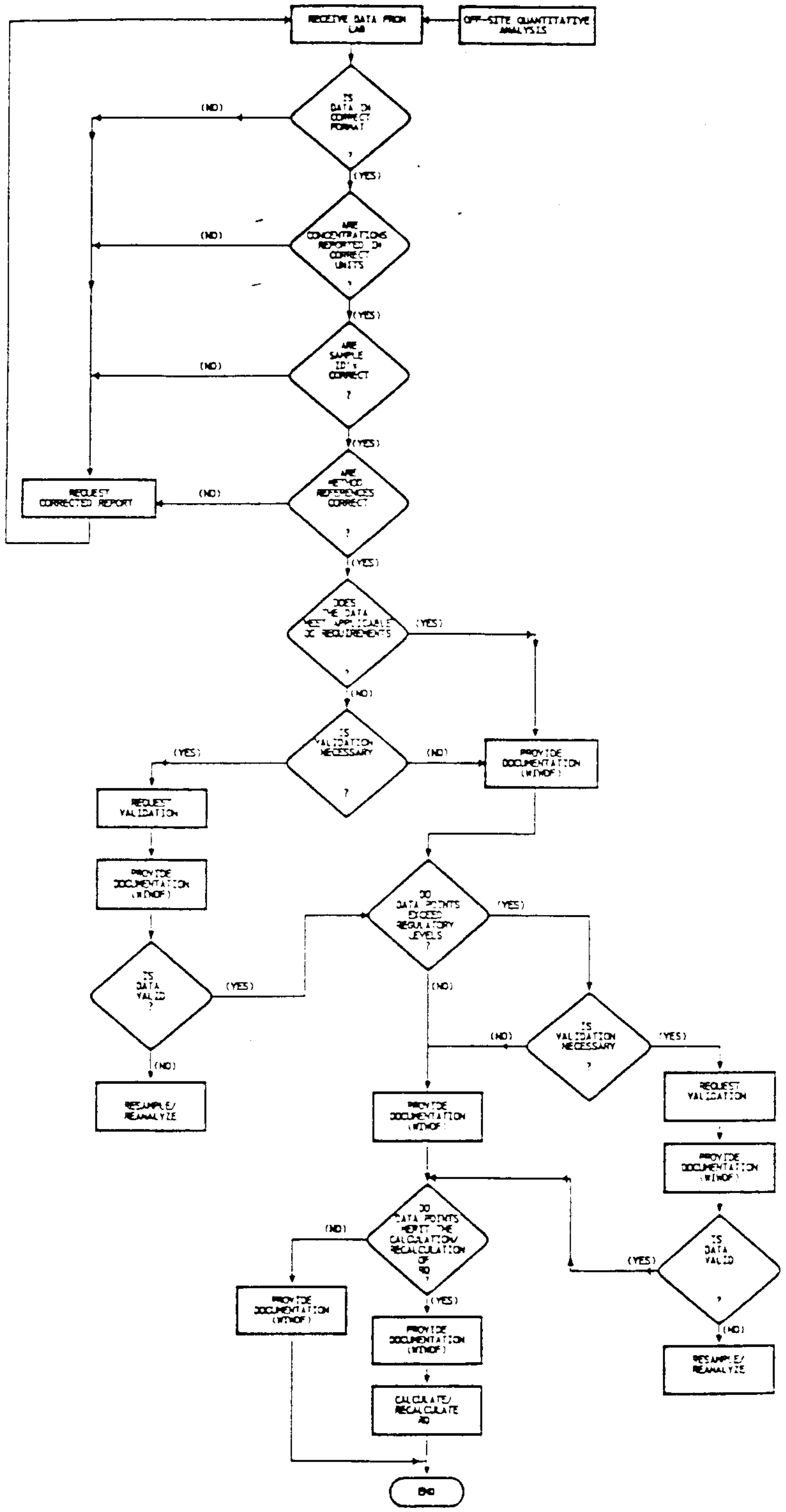
Matrix spikes and matrix spike duplicates are intralaboratory splits of a single sample that receive identical spike concentrations of the target analyte and are used to document the precision and bias of a method in a given sample matrix.

2.2 Data Verification

All detailed laboratory data must be reviewed and verified upon receipt by procedure ES&H 4.9.1 to ensure that documentation and data are reported in compliance with established reporting requirements and standard operating procedures (SOPs), and to ensure all requested analyses are performed. Only analytical methods specified in Table 1-4, or any attachments to this *Waste Analysis Plan*, are to be used for detailed laboratory analyses. Substitutions or departures from these methods must not be allowed without written Project QA or Waste Management Department consent prior to the analysis.

Chain-of-custody procedures as detailed in procedure ES&H 4.1.2, including Laboratory Work Authorization Form completion, must be maintained for all samples submitted for detailed analysis. Waste Management Field Sampling Data Forms, as required by procedure RC-24s, must be maintained during all sampling operations to document sampling methods, equipment, and observations.

Analytical data in the form of a formal hard copy report must be reviewed as indicated in Figure 2-1 by technical Waste Management Group (WMG) personnel familiar with the investigation and/or the analytical protocols requested. This review determines the general acceptability of the data and the regulatory status of the material. Review of the data for each material must be documented on a Waste Inventory Tracking System (WITS) Data Sheet in accordance with procedure RC-13a.



WASTE MANAGEMENT

DATA REVIEW PROCESS

FIGURE 2-1

REPORT NO.:		EXHIBIT NO.: A/PI/123/0792
ORIGINATOR: LDP	DRAWN BY: SRS	DATE: 7/92

2.3 Data Validation

Data validation documents the quality and usefulness of the data and the documentation developed during sample analysis. Laboratory records of analytical data and quality related field data are reviewed to assess laboratory performance as compared to quality control criteria, data quality requirements, and procedural requirements.

Approximately 5% of the data points from waste samples submitted to the contract laboratories will be validated. These data points will be selected randomly by the laboratory coordinator. An additional 5% of the data points will be selected for validation by technical personnel familiar with the particular waste analysis program after the data review portion of the verification process is complete.

2.4 Waste Analysis Records and Documentation

All waste analysis QA records must be maintained on file by the QA Department in accordance with procedure QAPP-9 for the duration of the project or until otherwise directed by the U.S. Department of Energy (DOE). At a minimum, these records will be retained for 10 yr after the completion of remedial actions as required by the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA).

Waste analysis QA records must include the following:

- Waste Management Field Sampling Data Forms (RC-24s)
- Chain-of-Custody Forms (ES&H 4.1.2)
- Laboratory Authorization Request Forms (ES&H 4.1.2)
- Field Analysis Data Sheets (FADs) (RC-21s)
- Supplemental Analysis Report (SAR) (RC-37s)
- Bench Scale Compatibility Determination (RC-26s)
- Drum Inventories (RC-26s)
- Waste Inventory Tracking System (WITS) Data Sheet (RC-13a)
- Analytical data reports received from detailed laboratory analyses
- Certification of Nonradioactive Waste (RC-32s)

Duplicates of all the above are maintained by the WMG in the waste analysis files. For containerized wastes, all data and forms pertaining to a particular container are placed into a file unique to the WITS number assigned to that container. All other data are filed by sampling event or activity.

Additionally, all WMG field personnel are required to maintain field logs in accordance with procedure RC-38s. These logs should contain additional information such as discussions and observations that can further support or detail the decision making process logic. When complete, these logs are transferred to the QA department for maintenance as project QA records.

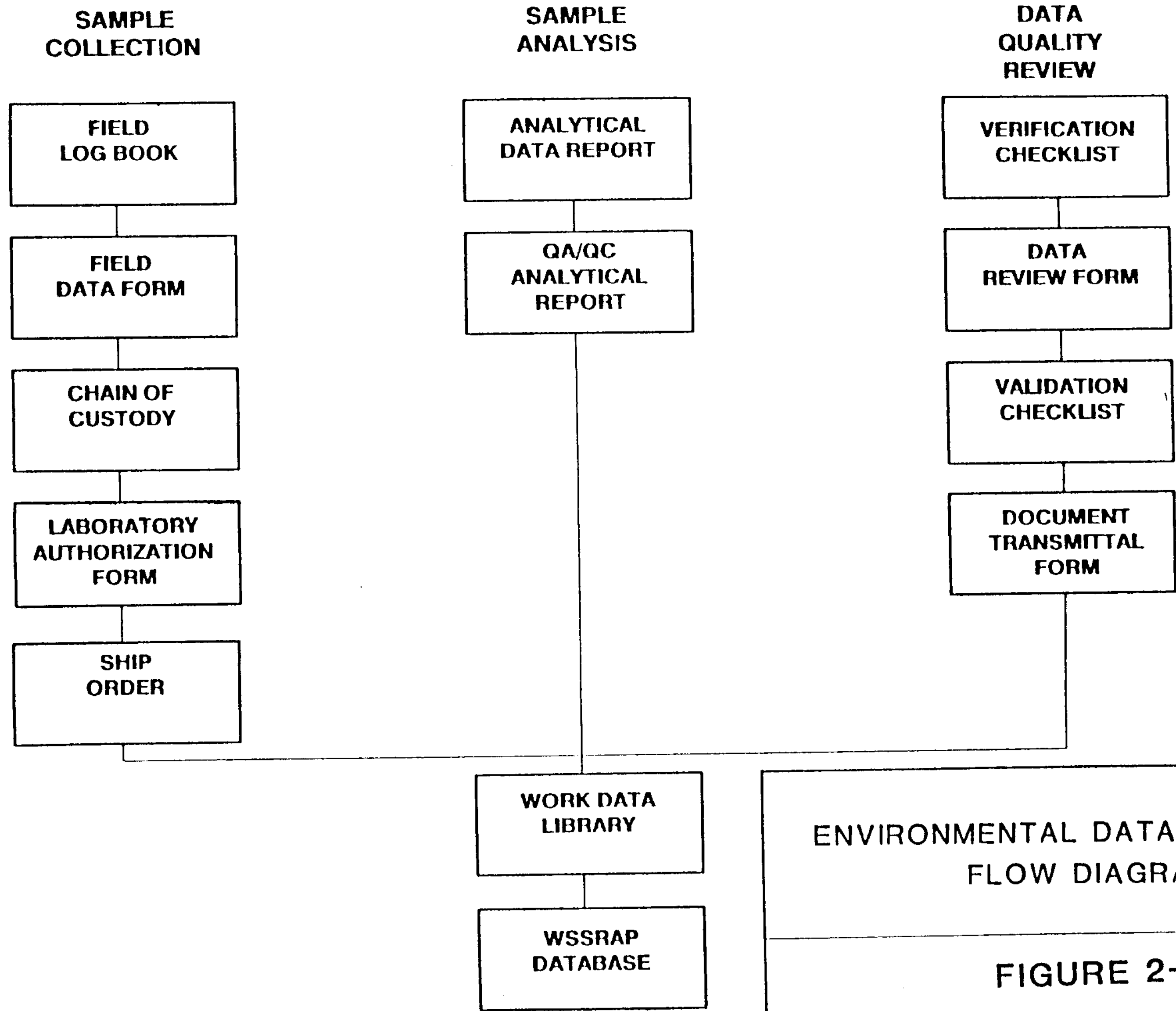
All waste analysis data from detailed laboratory analyses are placed in the generic universal report utility (GURU) data base. Data in the GURU database can be extracted and sorted based on sample identification number, parameter, or any other field definition. Users are allowed to view or copy records, but records cannot be modified or deleted in the GURU system.

A WITS database maintained by the WMG is designed to identify the locations and various types of materials during all phases of the project including final disposition. The WITS data form is used to document original inventory along with all additions and/or changes to the WITS based on field observations, field analysis or consolidation, and data from detailed laboratory analysis. The database includes regulatory class information, U.S. Environmental Protection Agency (EPA) or Missouri Department of Natural Resources (MDNR) waste identification numbers, container type and weight, as well as waste form descriptions.

The waste analysis data audit trail is detailed in Figure 2-2. It should be noted that only project QA-approved laboratories are used for detailed laboratory analysis. Technical specifications for analytical support, which detail the specific criteria for approval, must be used to solicit responses from qualified analytical laboratories. Ability to perform work in accordance with SW-846 and EPA Contract Laboratory Program (CLP) protocol must be included as requirements.

Audits and surveillances, in accordance with procedure QAPP-10, must be performed at laboratories providing analytical support to the WSSRAP to ensure that the laboratory meets the requirements of the technical specification and to monitor laboratory performance.

ENVIRONMENTAL DATA AUDIT DOCUMENTATION



ENVIRONMENTAL DATA AUDIT DATA FLOW DIAGRAM

FIGURE 2-2

REPORT NO.:		DRAWING NO.: A/PI/021/0590	
ORIGINATOR: LDP	DRAWN BY: GLN	DATE: 5/90	

QA surveillances shall also be periodically performed on various WM activities in accordance with procedure SQA-2a. These surveillances monitor compliance with site policies, procedures, and regulatory requirements.

2.5 Training

All WMG personnel involved in sampling, characterization, or data evaluation must be trained in accordance with the *Waste Management Training Plan* (MKF and JEG 1992b). Additionally, persons performing analysis in the waste management field laboratory must be trained according to the *Laboratory Chemical Hygiene Plan* (MKF and JEG 1991a) as required by Occupational Safety and Health Administration (OSHA).

3 SAMPLING METHODS

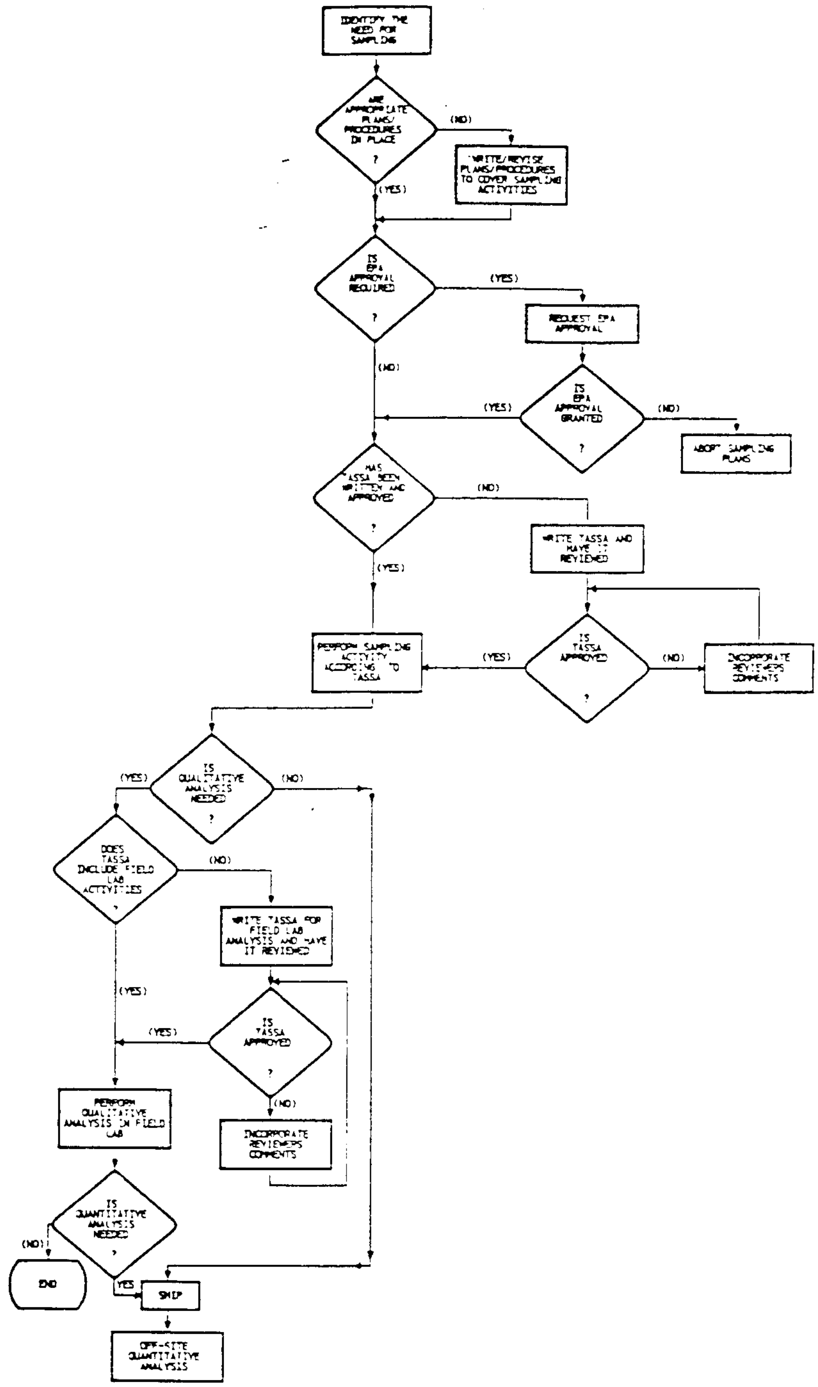
Sampling requires collecting representative samples of the waste and is performed with both accuracy and precision to increase the validity of the waste analysis. The sampling method of choice must be capable of providing both a horizontally and vertically representative sample of the waste material being sampled. The sampling methods and equipment used for sampling waste materials will vary with the form and consistency of the waste materials. The wide variety of waste types and containment devices present at the Weldon Spring site (WSS) makes it impossible to recommend a universal sampling procedure. Procedure RC-24s details the requirements for sampling containers such as drums, bags, cans, and bottles as well as swipe sampling and volumetric sampling of porous materials such as wood and concrete. Detailed sampling plans specific to waste types and configurations will be developed as necessary to support site activities. These plans must detail sampling methods, locations, number of samples, and data quality objectives to be utilized to ensure that sufficient data are obtained to adequately characterize all wastes. Figure 3-1 details the sampling process and sampling plan development logic.

3.1 General

All waste management sampling activities will require that the task be detailed daily as required by procedure CM&O-15a *Task Specific Safety Assessment* (TaSSA) . The TaSSA will specify, at a minimum, the material to be sampled, the sampling equipment to be utilized, and manpower requirements. At a minimum, waste management sampling teams will consist of two persons.

Appropriate air monitoring measurements listed on the TaSSA will be made to assess the possibility of the container holding volatile or flammable constituents and to assist in determining appropriate protective measures to be implemented by the sampling team and all support personnel.

Sufficient volume of a sample, adequate in size for all needs such as laboratory analysis and quality control, and splitting with other organizations, must be collected. Samples for detailed laboratory analysis must be collected in sufficient volume (where possible) to analyze the sample volume specified in the appropriate analytical methodology, including quality control samples. Samples of wastes known to contain high concentrations of hazardous components



REQUIREMENTS PRIOR TO
THE SAMPLING PROCESS

FIGURE 3-1

REPORT NO.:	EXHIBIT NO.: A/PI/124/0792

ORIGINATOR: LDP	DRAWN BY: SRS	DATE: 7/92

require only a small aliquot for analysis. Samples requiring preservation (see Table 3-1) will have the appropriate preservation agent added in the field. Sample containers shall be filled to capacity when possible. The use of metal sample containers must be avoided. Wide-mouth brown glass bottles or jars with teflon lined closures are the preferred sample container. In all instances, however, the sample container must be compatible with its proposed contents.

A representative sample is crucial to characterization of the waste and is dependent upon proper selection of sampling points. No single series of sampling points can be specified for all types of receptacles. Table 3-2 lists examples of common types of receptacles used for waste materials and the corresponding recommended sampling equipment. Extreme care must be exercised to overcome stratification or encapsulation that may inhibit obtaining a representative sample. If stratification is suspected, several vertical "core" samples may be required to be consolidated as a representative sample. In the event of suspected encapsulation, several vertical and horizontal cross sectional cuts may be required to determine the degree of encapsulation proper to sampling.

Sampling procedures vary depending on the medium sampled (liquid, semisolid, or solid) and the type of structure containing the waste. The following discussion addresses procedures that are recommended for sampling wastes in various media and types of containers. Environmental compliance procedure RC-24s details the sampling process. When collecting samples for volatile organics analysis, care must be exercised to avoid unnecessary mixing or agitation that may volatilize or lose analytes of interest and lead to the generation of erroneously low results.

3.2 Sampling Strategies

Sampling methods employed at the Weldon Spring Site Remedial Action Project (WSSRAP) will vary depending on the nature and extent of known or suspected contamination, the information desired, and the end use of the data. Simple random sampling will be utilized as a probable statistical technique for obtaining accurate and precise samples when no information on the chemical or radiological properties of a waste are available. In random sampling, every unit in the waste population has a theoretically equal chance of being sampled and measured. The method of choice at the WSS for selecting a random sample is to divide the

TABLE 3-1 Required Containers, Peservation Techniques, and Holding Times For Wastes Samples*

Name	Container[a]	Preservation	Maximum holding time
Inorganic Tests:			
Bromide	P,G	None required	28 days
Chloride	P,G	None required	28 days
Cyanide, total and amenable to chlorination	P,G	Cool, 4°C, NaOH to pH > 12, 0.6g ascorbic acid	14 days
Fluoride	P	None required	28 days
Hydrogen ion (pH)	P,G	None required	Analyze immediately
Kjeldahl and organic nitrogen	P,G	Cool, 4°C, H_2SO_4 to pH < 2	28 days
Moisture	P,G	None required	
Nitrate-nitrite	P,G	Cool, 4°C, H_2SO_4 to pH < 2	28 days
Oil and grease	G	Cool, 4°C, H_2SO_4 to pH < 2	28 days
Organic carbon	P,G	Cool, 4°C, HC1 or H_2SO_4 to pH < 2	28 days
Phenols	G only	Cool, 4°C, H_2SO_4 to pH < 2	28 days
Phosphorus, total	P,G	Cool, 4°C, H_2SO_4 to pH < 2	28 days
Residue, total	P,G	Cool, 4°C	7 days
Residue, Nonfilterable (TSS)	P,G	Cool, 4°C	7 days
Residue, Settleable	P,G	Cool, 4°C	48 hours
Residue, Volatile	P,G	Cool, 4°C	7 days
Sulfate	P,G	Cool, 4°C	28 days
Sulfide	P,G	Cool, 4°C, add zinc acetate plus sodium hydroxide to pH > 9	7 days
Metals:			
Chromium VI	P,G	Cool, 4°C	24 hours
Mercury	P,G	HNO_3 to pH < 2	28 days
Metals, except chromium VI and mercury	P,G	HNO_3 to pH < 2	6 months
Sulfite	P,G	None required	Analyze immediately
Viscosity	P,G	None required	
Sulfur	P,G	None required	
Asbestos	P,G	None required	
Paint Filter Test	P,G	None required	
Heating Value (BTU)	G	None required	

* Aqueous Samples that are highly acidic (pH < 2) or causitc (pH > 12) or concentrated waste samples no preservation is required.

[a] Polyethylene (P) or Glass (G)

TABLE 3-1 Required Containers, Peservation Techniques, and Holding Times For Wastes Samples* (Continued)

Name	Container[a]	Preservation	Maximum holding time
Organic Tests:			
Purgeable Halocarbons	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$	14 days
Purgeable aromatic hydrocarbons	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$, HC1 to pH2	14 days
Acrolein and acrylonitrile	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$, Adjust pH to 4-5	14 days
Phenols	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	7 days until extraction, 40 days after extraction
Benzidines	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	7 days until extraction
Phythalate esters	G, Teflon-lined cap	Cool, 4°C	7 days until extraction 40 days after extraction
Nitrosamines	G, Teflon-lined cap	Cool, 4°C, store in dark, 0.008% $Na_2S_2O_3$	40 days after extraction
PCBs, acrylonitrile	G, Teflon-lined cap	Cool, 4°C	40 days after extraction
Nitroaromatics and isophorone	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ store in dark	40 days after extraction
Polynuclear aromatic hydrocarbons	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ store in dark	40 days after extraction
Haloethers	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	40 days after extraction
Chlorinated hydrocarbons	G, Teflon-lined cap	Cool, 4°C	40 days after extraction
TCDD	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$	40 days after extraction
Total organic halogens	G, Teflon-lined cap	Cool, 4°C, H_2SO_4 to pH<2	7 days
Pesticides Tests:			
Pesticides	G, Teflon-lined cap	Cool, 4°C, pH 5-9	40 days after extraction
Radiological Tests:			
Alpha, beta and radium	P,G	HNO_3 to pH<2	6 months

* Aqueous Samples that are highly acidic (pH<2) or causitc (pH>12) or concentrated waste samples no preservation is required.

[a] Polyethylene (P) or Glass (G)

TABLE 3-2 Sampling Equipment for Selected Waste and Containers

Waste Type	Drum		Sacks & Bags	Small Bottles[a] & Cans	Tanks or Bins	Waste Piles	Sumps, Pits, & Lagoons	Pipe	Equipment & Items
	Bung Type	Open Top							
Liquids and slurries	(b)	(b)	NA	Glass Tube	Weighted bottle or Coliwasa	NA	Weighted Bottle/ Dipper	Dipper /Swipe	Grab/Swipe
Sludges	Trier/ Dipper	Trier/Dipper	NA	Trier	Trier	(c)	(b)	Dipper	Dipper
Moist powders or granules	Trier	Trier	Trier	Thrier	Trier	Trier	Trier	Dipper	Dipper
Day sand, powders, or granules	Thief	Thief	Thief	Thief	(c)	(c)	Trier/Thief	Dipper	Dipper
Sand or packed solids	Auger	Auger	Auger	Auger	(c)	Thief/ Auger	Auger	Dipper	Dipper/Scoop
Solid sheets or rods	NA	Grab	Grab	Grab	NA	Grab	NA	NA	NA
Wood	NA	(c)	NA	NA	NA	(c)	(c)	NA	NA
Concrete	NA	Auger	(d)	(d)	NA	(c)	NA	NA	NA

a Generally less than 10 gallon total volume.
b Approved sampling equipment (coliwasa, glass tube, dipper, vac sam or peristaltic pump) to be selected based on quantity and homogeneity of waste.
c Sampling equipment must be selected based on waste conditions and configuration on a case-by-case basis.
d If loose powder use device as indicated for dry sand, powder, or granules, otherwise use on auger.

population by an imaginary grid, assign a series of consecutive numbers to the units of the grid, and select the units to be sampled through the use of a random numbers table.

This principle can also be applied when the waste population to be sampled consists of a collection of discreet units such as drums, telephones poles, railroad ties, and pieces of equipment. In this instance, each unit is assigned a consecutive number and the units to be sampled are selected through the use of a random numbers table.

Systematic random sampling can be useful when contamination is known (or suspected) and the boundaries of the contamination zone must be determined. In this type of probability sampling, the first sample to be collected from a population is randomly selected, but all subsequent samples are taken at fixed space or time intervals. Table 3-3 indicates the number of samples required for various container or grid populations.

Composite sampling is utilized when the proposed sample population is very large and analytical costs are a factor, as well as when sample volumes from units are insufficient for analysis when taken individually. In composite sampling, a number of random samples are initially collected from a waste and combined into a single sample, which is then analyzed for the chemical contaminants of concern.

Grab sampling is utilized when discreet units are taken as samples and when knowledge is desired on batches from continuous generation operations.

Swipe sampling is used when knowledge is desired about surface contamination. This form of sampling is useful in determining if hazardous residuals from spills or processes may be present on floors, equipment, and process vessels such as tanks and piping.

Volumetric sampling is utilized on porous materials such as wood or concrete to determine the extent of penetration of the contaminant of interest. It involves boring or coring holes into the material to predetermined depths and removing samples for analysis.

A number of factors in addition to statistical considerations will influence sampling strategies. Obviously, one of the most important factors is the waste and its properties. The following waste properties are examples of what must be considered when choosing a sampling strategy.

TABLE 3-3 Sample Quantities for Various Waste Populations

Population	Number of units to be sampled
1-10	5
11-15	7
16-20	8
21-30	10
31-40	13
41-50	15
More than 50	Minimum of 33%

- Physical state: The physical state of the waste will affect most aspects of a sampling effort. The sampling device will vary according to whether the sample is liquid, solid, or multiphasic. If the waste is a liquid, consideration must be given to whether it is viscous or free-flowing. If it is a solid, consideration must be given to whether the solid is hard or soft, powdery, or clay-like.

  The sampling strategy will have to vary if the physical state of the wastes allows for stratification, homogenization, or random heterogeneity.

- Volume: The volume of the waste, which must to be represented by the samples collected, will have an effect upon the choice of sampling equipment and strategies. Sampling the raffinate pits requires a different approach from sampling a drum. Although a drum may be sampled with a coliwasa or drum thief, a weighted bottle may be required to sample a 20 ft tank.

- Hazardous properties: Safety and health precautions and methods of sampling and shipping will vary dramatically with the toxicity, ignitability, corrosivity, and reactivity of the waste.

Site-specific factors such as accessibility must be considered when designing a sampling strategy. The accessibility of waste can vary substantially. Some wastes are accessed simply by opening a drum; others may require that a tank be emptied or a container excavated.

3.2.1 Sampling Drum

Access to a drum will affect the number of samples that can be taken from the drum and the location within the drum from which samples can be taken. Bung top drums, which generally indicate the presence of liquids or sludges, limit access to the contained waste and restrict sampling to a single vertical plane.

Such drums will be positioned with the bung in an upright position. The bung will be slowly loosened using a non-sparking bung wrench allowing any gas pressure to release. If the bung cannot be removed or loosened it may be necessary to remove the top of the drum or other method to gain access to the material.

If the material is known to be homogeneous, a coliwasa, glass tube, vacsam sampling pump, or peristaltic sampling pump may be used to collect the sample. However, for most drums on the WSS the extent of homogeneity of the material cannot be verified and mixing of liquids will be required prior to sampling with the above equipment.

For sludge or solids, the top of the drum will be removed to allow better access to the material. The surface of the waste will then be divided into an imaginary grid composed of eight sections as detailed by procedure RC-24s and selecting a minimum of five grid points to be sampled. Each selected grid point will then be sampled in a vertical manner along the entire length from top to bottom of the drum. These samples will then be composited to form a single sample.

3.2.2 Sampling Barrels, Fiberdrums, Bags, or Sacks, Containing Powder, Granular, or Packed Solids

Where possible containers will be positioned upright prior to sampling. If possible, sacks or bags will be sampled as found to avoid rupturing them and spilling the contents.

The container will be opened slowly and in such a manner so as to minimize the generation of airborne contaminants. For drums, the surface of the waste will be divided into an imaginary grid composed of eight sections and a minimum of five grid points will be selected for sampling. Each selected grid point will then be sampled in a vertical manner along the entire length from top to bottom using an auger, trier, thief, scoop, or shovel. A composite sample will then be created from these samples.

3.2.3 Sampling a Tank

Tanks can generally be viewed as large containers or drums. Thus, in many cases, the principles that are applied to sampling a drum can also be applied to sampling a tank.

The majority of tanks found at the WSSRAP are found at the Weldon Spring Chemical Plant (WSCP) and were present when the plant was closed. These tanks have been visually inspected and the majority were found to be empty.

For tanks located within the structures at the WSCP, a team of representatives from various departments of the Project Management Contractor (PMC) is required to assess the best means of approaching and gaining access to the tank because of the generally poor physical condition of the buildings. This assessment will also attempt to determine the best location to obtain the sample. Normally the sample can be obtained through the sampling hole or hatch which is usually located at the top of the tank. In some instances it may be necessary to remove a flange or a pipe to gain access to a tank. If no other access point is available, a sample may be obtained through a bottom valve. Such a sample will generally not be representative of the overall tank contents and must be documented on the waste management sampling data form as required by procedure RC-24s.

For tanks containing liquids, a measurement of the depth of the liquid in the tank shall be made using a weighted line or rigid pole and measuring the length of stain on the device.

If a tank is equipped with a recirculating pump, the pump should be activated and the contents of the tank allowed to mix for a minimum of 5 min prior to sampling. A sample can then be collected using a coliwasa, peristaltic pump or a vacuum pump.

If the tank is not equipped with a recirculating pump, a sample will then be collected from selected depths using a weighted bottle depending on the estimated volume of waste in the tank. A coliwasa can also be used to sample in a vertical manner along the entire length from top to bottom if a coliwasa of sufficient length is available.

In some instances, it may be more feasible to obtain a sample for detailed analysis as the contents are being transferred to new containers or drums. In this instance, samples can be collected at random intervals during the transfer process or by collecting samples from the containers or drums after the transfer is complete.

If the tank is an open one, allowing unrestricted access, then a representative set of samples is usually obtained by dividing the tank into an imaginary three-dimensional grid and assigning sections numbers. Specific levels and grid locations are then sampled using a random number table.

3.2.4 Sampling a Pit, Pond, or Sump

Wastes found in pits, ponds, or sumps may range from liquids to dried sludge residues. Liquid or semi-solid wastes in these configurations are often best sampled using strategies applicable to large tanks.

If the pit, pond, or sump is sufficiently small, it may be sampled from the banks or edges or by use of a catwalk or bridge. For pits or ponds greater than 12 ft across, a boat or other such device may be required. In either case, the requirements for working on or near water as detailed in procedure SAFE-8a must be met.

The surface of the area to be sampled will be divided into an imaginary grid. The number of grid sections will be determined by the desired number of samples to be collected. Samples will be collected from random points on the grid and in various depths in accordance with procedure ES&H 4.3.1s. Based on the findings of these activities, composite samples will be created by combining compatible samples as determined by RC-26s.

Compressed air or other circulating devices may also be utilized to mix the waste within a pit or sump in order to improve the homogeneity of the waste prior to sampling. In this manner any solids or sediments that may have settled will be resuspended or dissolved prior to sampling.

A ponar sampler lowered to the bottom of the pond, pit, or sump by a rope or cable may be used to sample sediments or sludges that may have settled if that is to be the focus of the sampling activity.

A weighted bottle may be used to sample liquids. A peristaltic or vacuum pump may be used if the waste can be made homogeneous. A coliwasa may even be used if the pit, pond, or sump is sufficiently shallow.

Hollow-stem augers and/or split-spoon samplers are appropriate for sampling solids. Water-driven or water-rinsed coring equipment should not be used for sampling because the water can rinse chemical components from the sample. Excavation equipment may be useful in obtaining samples at various depths or in gaining access to buried targets. The resulting holes may be useful for viewing and recording information on buried debris or stratified materials.

3.2.5 Sampling a Waste Pile

A waste pile can range from a small heap to a large aggregate of wastes. The wastes are predominantly solid and can be mixtures of powders, granules, and large chunks and may be composed of wood, metal, plastic, or other debris. Obtaining a representative sample through the employment of a universal sampling procedure is not possible and therefore must be addressed on a case-by-case basis. When samples are required from a waste pile, a unique sampling plan will be prepared by the Waste Management Group in an effort to obtain accurate and representative samples.

The accessibility of waste within a waste pile is usually a function of pile size. Ideally, piles containing unknown wastes are sampled using a three-dimensional random sampling strategy. If sampling is limited to certain portions of the pile, then the collected sample will be representative only of those portions, unless the waste is known to be homogeneous.

Samples from the temporary storage area (TSA) or material storage area (MSA) should be taken from the truckloads used to create the pile prior to the waste being placed in the pile, where possible.

The sampling devices most commonly used for small piles include thief, triers, and shovels.

3.2.6 Sampling a Pipe

Sampling the contents of a pipe can present unique and difficult problems. Identifying a sampling point that may yield a representative sample may not be an easy task.

Available drawings from the WSCP, which detail the piping configurations, will be reviewed in an effort to tentatively identify the materials that may be present in the piping system as well as potential sampling points. If sufficient information cannot be obtained from these drawings, visual inspections by a group of representatives from various PMC departments will be performed to determine appropriate sampling points. This assessment is detailed in the *Building Characterization Work Plan* (MKF and JEG 1991b).

A hole can be drilled in the top of a pipe to gain access if no valve, fitting, or flange is present at or near the chosen sampling point. The hole must be sufficiently large to allow access to the waste by the chosen sampling device.

For active piping systems, sampling ports or valves must be utilized to obtain samples from the process.

Swipes may be utilized to determine the presence of residues within piping systems.

3.2.7 Volumetric Sampling of Concrete and Wood

Many areas at the WSSRAP have been found to be chemically contaminated from spills that occurred during the active life of the facility. For porous surfaces such as concrete and wood, it is imperative that the extent of migration of these materials be determined to determine management practices for these wastes.

For concrete surfaces and flat wood surfaces, the surface area to be sampled will be divided into an imaginary grid. The number of grid sections will be determined by the desired number of samples to be collected in accordance with guidelines established in SW-846. Samples will be collected by boring at random points on the grid to various depths in accordance with procedure RC-24s.

For wood materials such as railroad ties or telephone poles, random boring samples from various locations within the material will be consolidated. The number of samples to be collected and the number of composites required shall be determined based on the population available to be sampled.

For floors and flat surfaces, samples will be collected in areas where visible residues are on the floor and/or swipe sample data has shown residues to be present by establishing an imaginary grid system. Samples can be collected using a drill with masonry bits and a scoop or vacuum pump to collect the material.

Samples will be collected by drilling to a predetermined depth at selected points within the sample location. Sampling at selected increments should continue to a predetermined maximum depth. After each depth increment has been completed and the sample collected, the sample location area must be wiped clean of any residues using a paper towel or masselin cloth.

A minimum of five and a maximum of 20 spots should be composited within each grid location chosen for sampling. Less than five spots generally will not yield enough material to compromise a sample. However, if a sample location has been identified where the total surface area is less than 4 in.^{2}, it may not be possible to sample more than five spots. Using 20 samples as a maximum gives a valid representation of a large area. The representation will be optimum if the entire area is visibly oil stained and/or swipe data indicate the presence of residues in the entire area to be sampled. For areas where no visible stains are present, a grid system will be used in accordance with procedure RC-24. Regardless of size or how the area is laid out, all samples should be collected using a symmetrical method of sampling.

Most floors on site are structurally sound. However, some areas of known contamination may be cracked throughout. If this is the case, sampling must be performed along a representative distance of the crack. All sample locations will be identified on respective building drawings. These drawings will be included in the final characterization report.

3.2.8 Sampling Soil

The techniques for soil sampling are numerous. The procedure utilized at the WSS is detailed in procedure ES&H 4.4.5s. This procedure is consistent with the objective of collecting soil samples to determine the amount of hazardous material deposited on a particular area of land.

3.2.9 Sampling for Determining the Radioactive Component of a Waste

Before wastes can be released off-site to an unlicensed facility, they are required to be certified to have nondetectable or background levels of radioactivity in accordance with procedure RC-32s. This requirement applies to all wastes originating and/or stored within the radioactive material management area (RMMA) and applies only to radionuclides from the natural U-238, U-235, and Th-232 decay series.

For wastes with a potential for volumetric contamination, at least three representative samples, adequate in size to perform radiological parameters, must be taken from the waste quantity. If radionuclides are heterogeneously dispersed within the waste, the coliwasa sampler or similar method must be used to obtain sample aliquots from the top, middle, and bottom of the waste quantity in accordance with RC-24s.

At least three samples must be taken from a matrix similar to the waste matrix except each matrix shall be known to be free of radioactivity in excess of naturally occurring levels. Each matrix will be approved on a case-by-case basis by the Waste Management Manager or his designee. For example, motor oil purchased from an auto parts store is similar to oils used at the WSS. Samples from the matrix must be collected in the same manner as potentially contaminated samples.

Samples must be analyzed radiochemically by an approved method detailed in this plan to measure radioactivity in excess of the lower limit of detection (LLD) in samples known to be free of radioactivity in excess of natural background levels.

Data must be evaluated and documented in accordance with the guidelines contained in procedure RC-32s.

Waste materials can be determined not to contain radioactivity based on process knowledge. Process knowledge includes information on the origin, storage, use, and potential exposures of the waste material. Process knowledge principally applies to sealed containers (e.g., pressurized paint cans, laboratory reagents, and motor oils); however, bulk materials may also be included. For example, large containers used as stock may be used for dispersal into smaller containers.

Criteria for designating materials nonradioactive per process knowledge are:

- The material must originate outside the RMMA. The approximate date the material was received on site must be recorded on the certification form. Information on purchased materials can be obtained through the Procurement Department.

- Documentation showing that the material has been tracked and controlled since received on site by specifically identifying the time and on-site locations during the life of the material.

- Proof that the material has not been exposed to known radioactivity. Possible exposures include direct contact with contaminated waste via mixing and exposure to airborne contamination via open containers. A statement on the use of the material must be included on the certification form.

4 WASTE ANALYSIS

Chemical analysis of the waste materials at the Weldon Spring Site Remedial Action Project (WSSRAP) is intended to identify hazardous characteristics or hazardous components present in each waste. It is also designed to provide information to ensure safe storage of the materials in compliance with all applicable regulations. In some cases, analytical data will provide the basis for choosing an appropriate means of treatment or disposal for a particular material.

The analytical procedures chosen for this *Waste Analysis Plan* can be divided into two groups: (1) field analyses; and (2) laboratory analysis.

Field analyses are intended to provide general information such as functional groups, general hazard class, and chemical compatibility for the purposes of consolidation and confirming label information if necessary. These tests, which will be performed at the Weldon Spring site (WSS), can also be used to determine the appropriateness of additional laboratory analyses.

Laboratory analysis, where appropriate, will provide more detailed information about the hazardous components or constituents of the waste. Laboratory analysis may also be required to determine exact concentrations of materials shown to be present during field analyses. In most instances, detailed laboratory analysis will be performed on containerized wastes after wastes have been consolidated or placed in their final storage containment.

The following sections contain a discussion of the analytical methodology appropriate to the general categories of wastes at the WSSRAP as well as the logic for choosing each analysis. It is conceivable that, during the course of this project, additional methodologies and technologies will become available. As these methodologies are identified and determined to be amenable to the wastes at the Weldon Spring site, they will be procedurialized, reviewed and approved by the Project Management Contractor (PMC).

4.1 Field Analyses

The procedures employed for chemical categorization of wastes in the field are organized into the procedural sets summarized below. These qualitative procedures are designed to provide general information concerning the material being tested. These tests are detailed in procedure RC-21s and RC-37s. If specific analyte concentrations are desired, representative portions of the waste must be submitted for laboratory analysis.

Knowledge of the functional groups present may be sufficient to determine the gross composition of the waste and minimize the need for more extensive laboratory analysis by allowing classification into a given reactivity group (see Table 4-1). The appropriateness of using any of the field testing procedures, prior to or in lieu of more sophisticated instrumental techniques, is left to the professional judgement of the supervising engineer. Figure 4-1 shows an example of a decision tree for determining the appropriateness of any field test to any given waste.

4.1.1 pH

Measurement of the pH aids in the identification of acids and bases and allows determination of proper handling, packaging and storage requirements. pH also indicates whether neutralization may be required as part of the treatment or disposal process (see Figure 4-1).

4.1.2 Redox

The oxidizing or reducing potential of a waste material is identified by this procedure. Due to the reactive nature of oxidizing and/or reducing agents, it is essential that these types of materials receive special packaging, handling and storage considerations. These materials must be segregated from all incompatible materials during storage (see Figure 4-2).

4.1.3 Solution-Reactivity and Special Functionality Tests

Treatment of the waste materials with water, a base, and various acids and solvents allows determination of its reactivity and solubility characteristics. This procedure allows identification of sulfides and cyanides, reactivity and solubility in acids and solvents, reactivity with water and the presence of water (see Figure 4-3).

TABLE 4-1 Reactivity Group Definitions

Reactivity Group No.	Reactivity Group Name
1	Acids, mineral, nonoxidizing
2	Acids, mineral, oxidizing
3	Acids, organic
4	Alcohols and glycols
5	Aldehydes
6	Amides
7	Amides, aliphatic and aromatic
8	Azo compounds, diazo compounds, and hydrazines
9	Carbamates
10	Caustics
11	Cyanides
12	Dithiocarbamates
13	Esters
14	Ethers
15	Fluorides, inorganic
16	Hydrocarbons, aromatic
17	Halogenated organics
18	Isocyanates
19	Ketones
20	Mercaptans and other organic sulfides
21	Metals, alkali and alkaline earth, elemental and alloys
22	Metals, other elemental and alloys in the form of powders, vapors, or sponges
23	Metals, other elemental and alloys as sheets, rods, moldings, drops, etc.
24	Metals and metal compounds, toxic
25	Nitrides
26	Nitriles
27	Nitro compounds
28	Hydrocarbons, aliphatic, unsaturated
29	Hydrocarbons, aliphatic, saturated
30	Peroxides and hydroperoxides, organic
31	Phenols and cresols
32	Organophosphates, phosphothioates, phosphodithioates
33	Sulfides, inorganics
34	Epoxides
101	Combustible and flammable materials, miscellaneous
102	Explosives
103	Polymerizable compounds
104	Oxidizing agents, strong
105	Reducing agents, strong
106	Water and mixtures containing water
107	Water reactive substances
108	Radioactively contaminated substances

FIGURE 4 1

FIELD TEST ANALYTICAL DECISION PROCESS

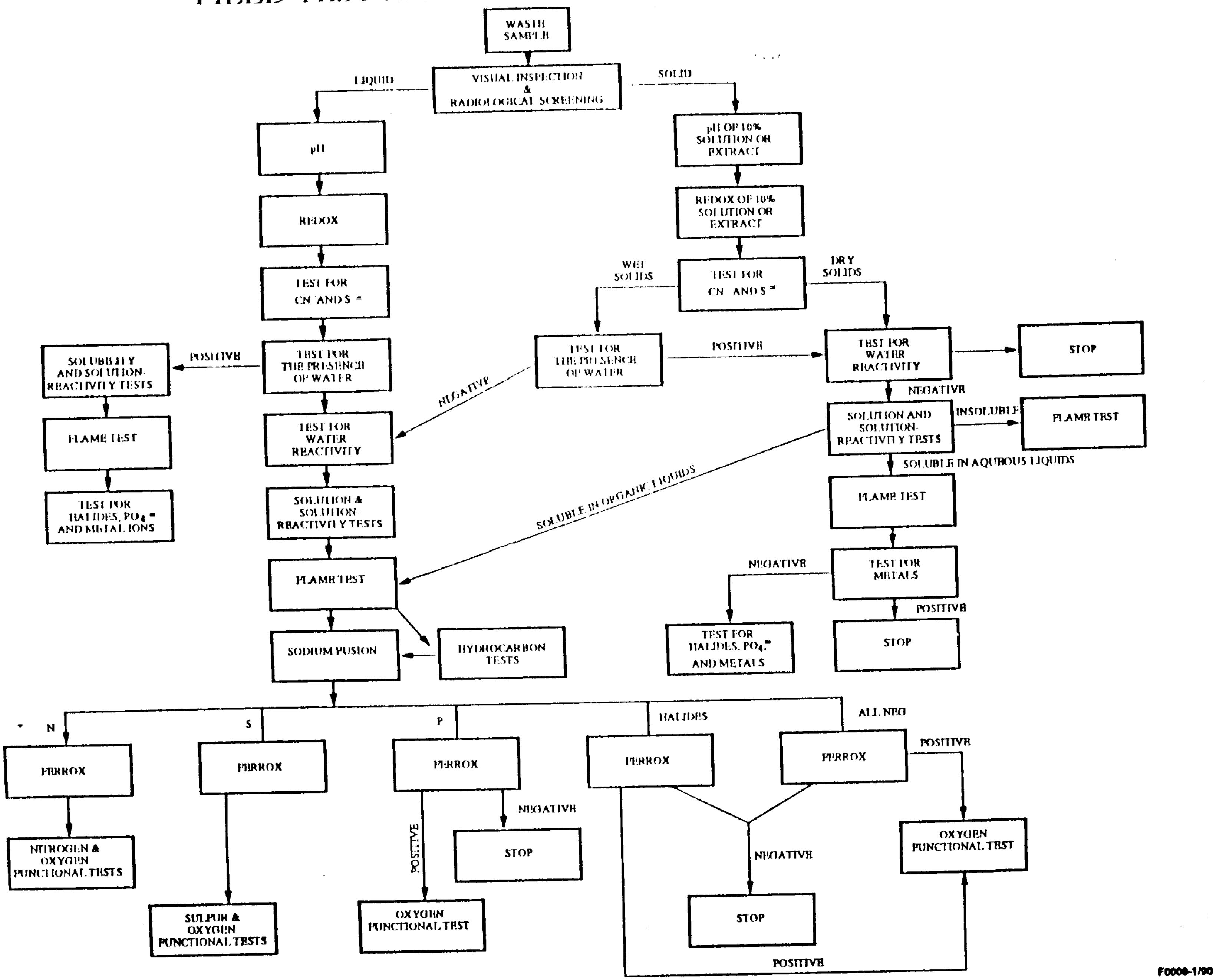


FIGURE 4-2
pH AND REDOX TESTS

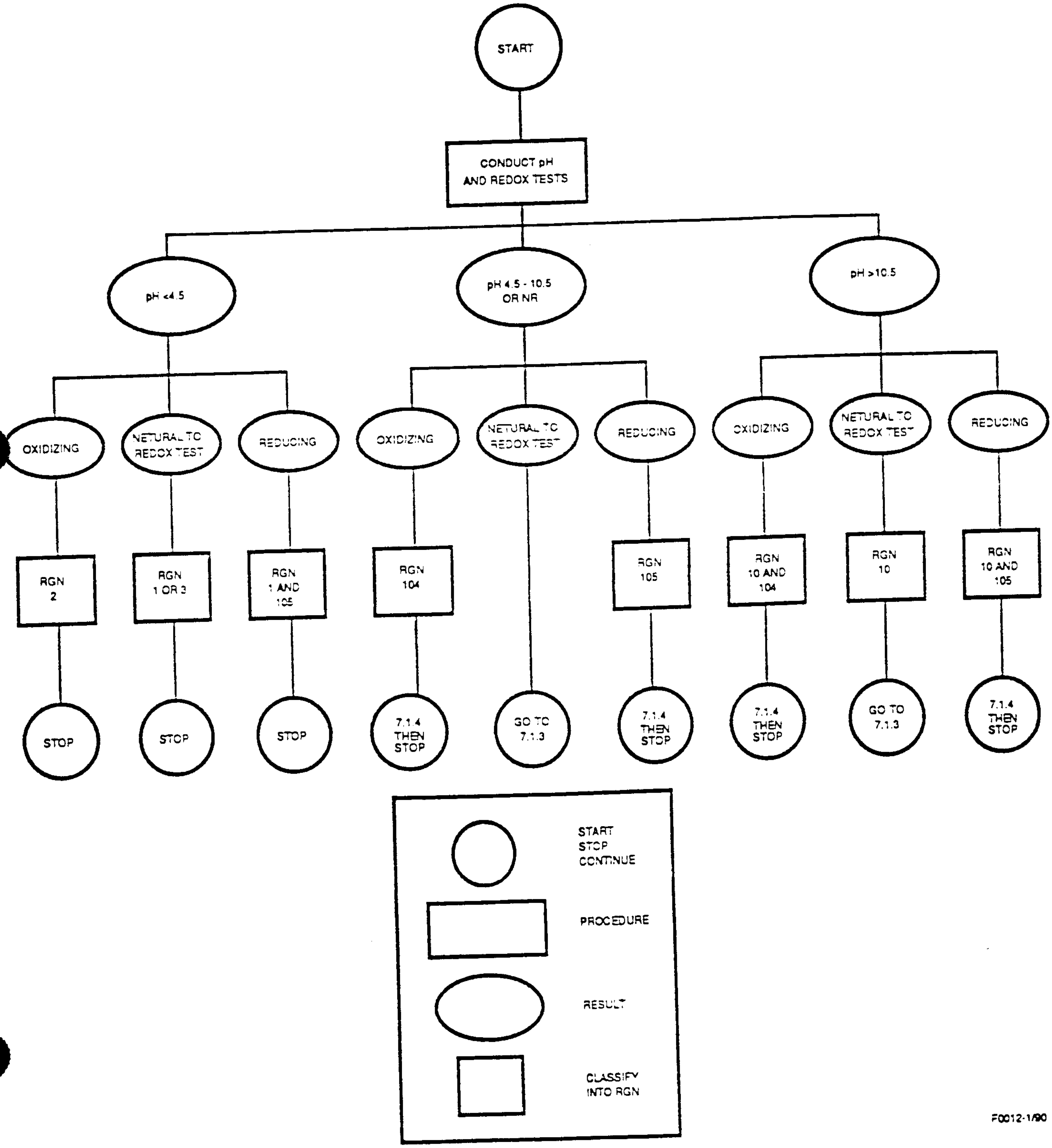


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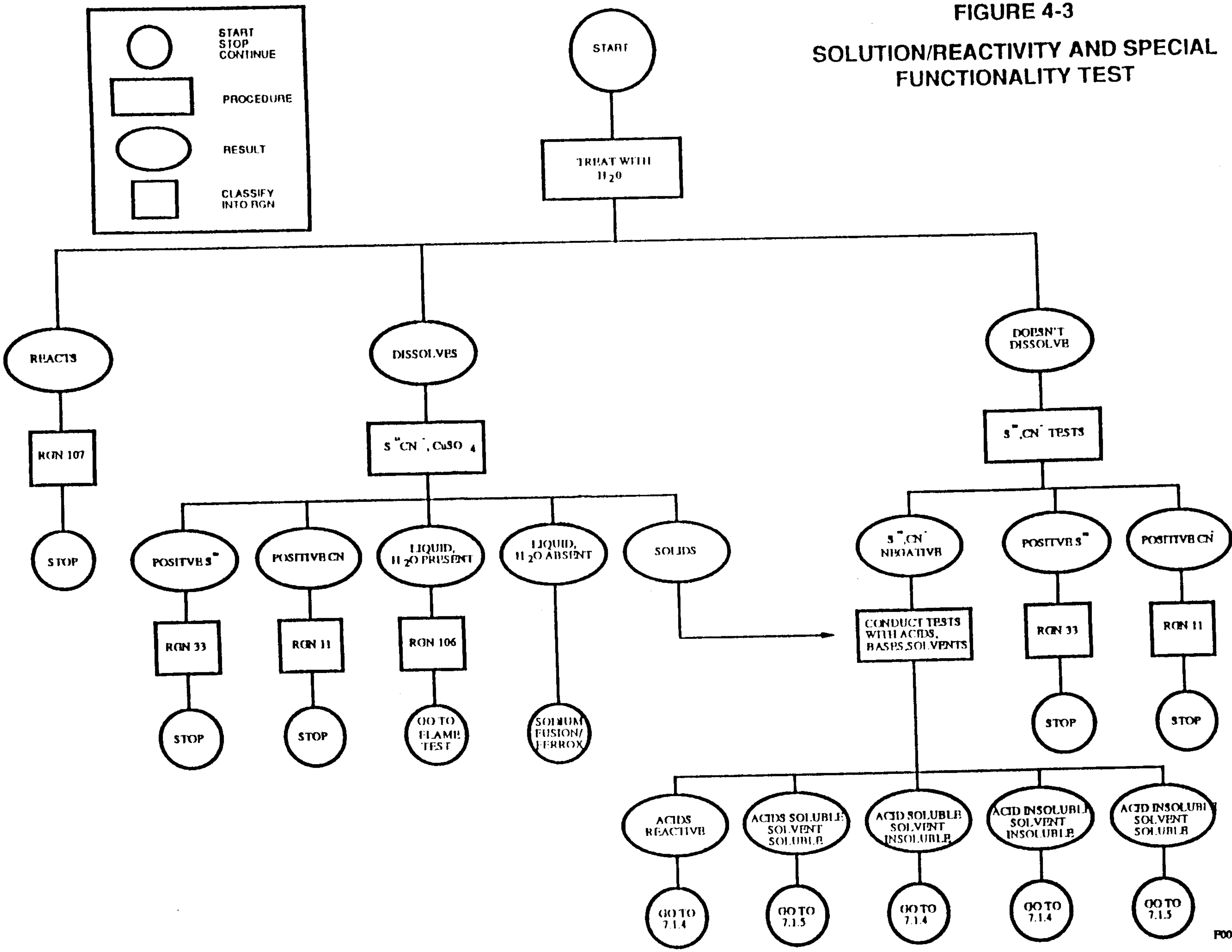
FIGURE 4-3

SOLUTION/REACTIVITY AND SPECIAL FUNCTIONALITY TEST



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4.1.4 Flame Test

Observation of the behavior of a material upon ignition can provide a great deal of insight regarding its composition. The combustibility of a material as well as its explosive tendencies can be determined using this procedure. This test can also aid in classification as inorganics or organics (see Figure 4-4).

Halogenated organics presented in a waste may create a characteristic flame during this test.

4.1.5 Sodium Fusion

The sodium fusion test, which is performed on organic waste materials, allows determination of the presence of certain halogens (chlorine, bromine or iodine), sulfur, nitrogen and/or phosphorus (see Figure 4-5). The results obtained from this procedure and the ferrox test are used as a guide for which specific functionality tests are to be performed.

4.1.6 Ferrox Test

The ferrox test is performed on organic waste materials, in the absence of sulfur, nitrogen, or phosphorus, to determine the presence of oxygen (see Figure 4-5).

4.1.7 Organic Functionality Tests

This set of procedures includes specific tests, subdivided into four major subsets, for determination of 21 reactivity groups. Each of the procedure subsets for nitrogen or sulfur is performed only if the respective element is determined to be present in the sodium fusion test. If the element was found to be absent, it can be concluded that all reactivity groups determined in that subset are absent. Oxygen is assumed to be present if sulfur, nitrogen, or phosphorus is confirmed by the sodium fusion test; then the oxygen subset is performed in addition to the other appropriate functionality test.

FLAME TEST FLOW CHART

FIGURE 4-4

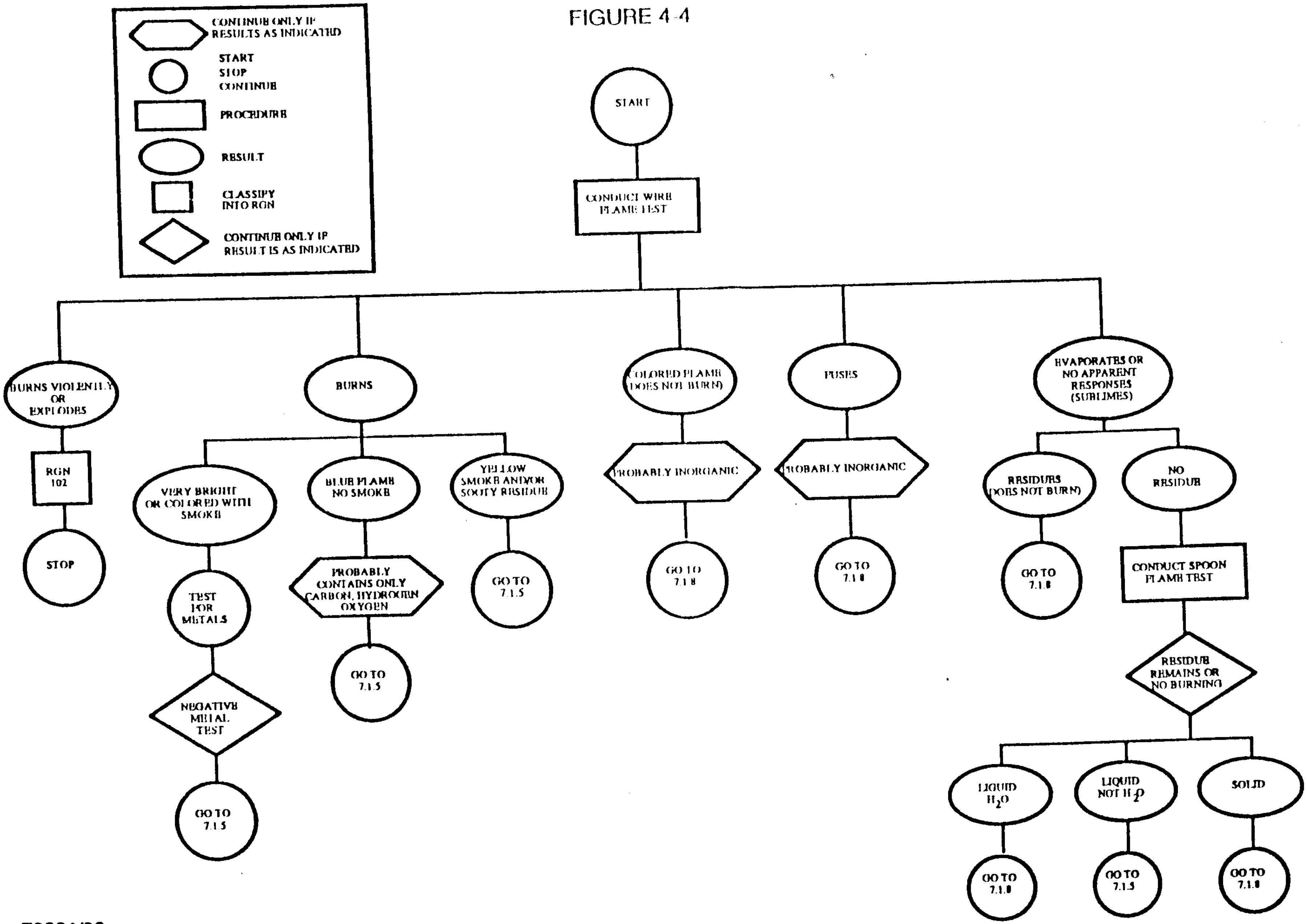

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FIGURE 4-5

SODIUM FUSION AND FERROX TEST FLOW CHART

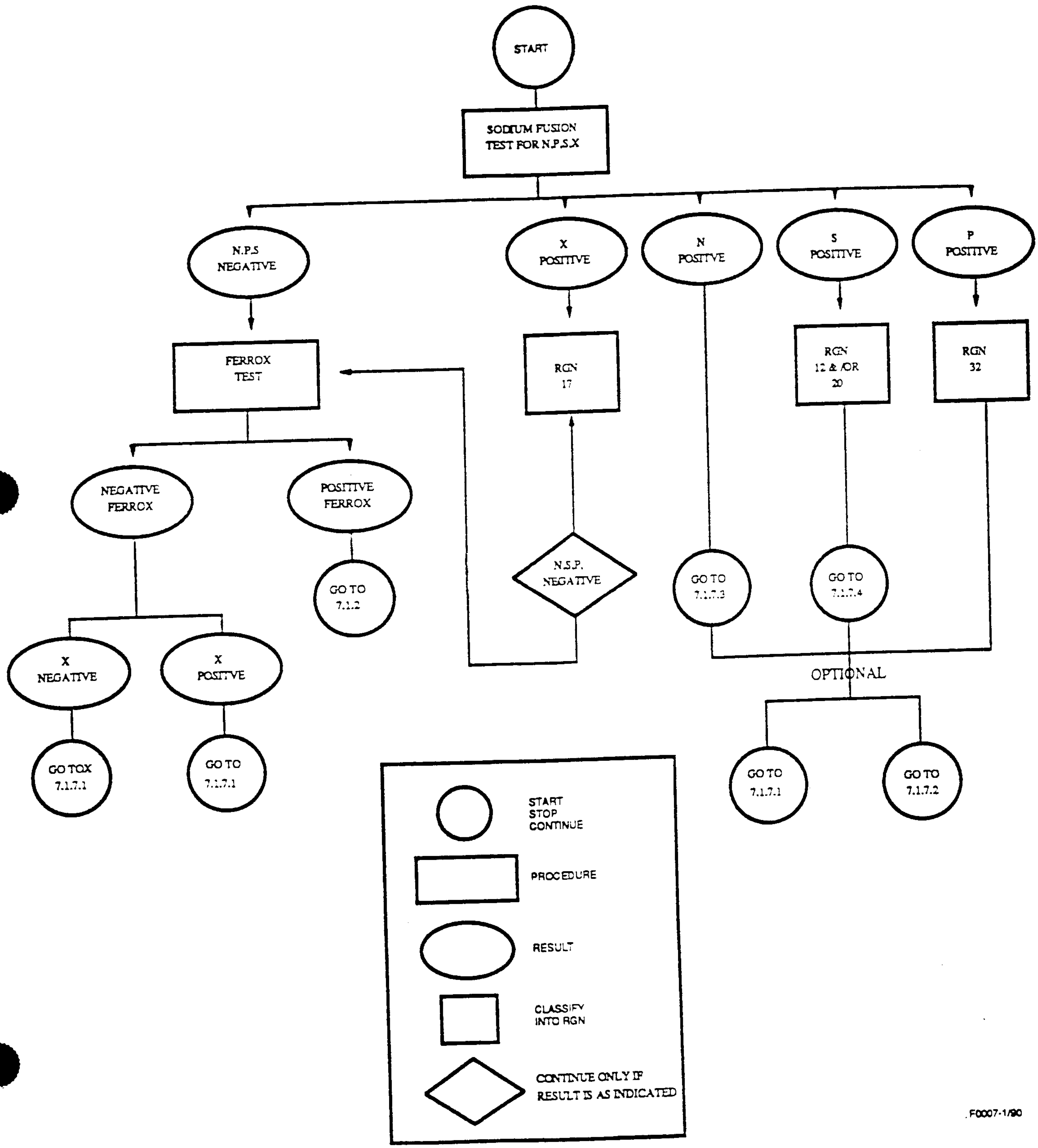

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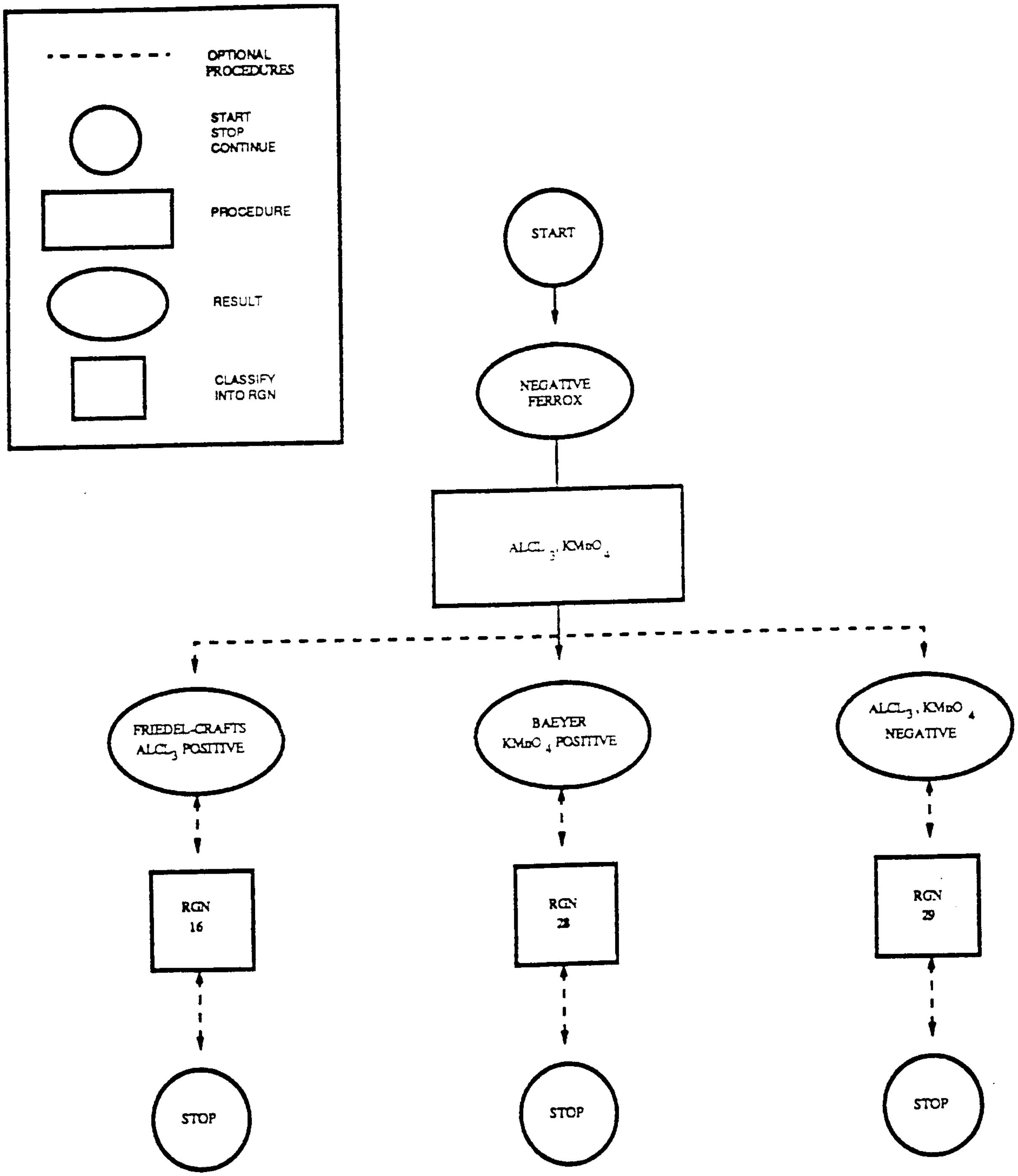
FIGURE 4-6

ORGANIC FUNCTIONALITY TESTS FOR HYDROCARBON CLASSIFICATION FLOW CHART



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4.1.7.1 Hydrocarbon Functionality Test

Saturated and unsaturated hydrocarbons and/or aromatic hydrocarbons are distinguished by this procedure. Due to the mutually exclusive nature of these reactivity groups, if one test is positive, the other need not be run (see Figure 4-6).

4.1.7.2 Oxygen-Containing Organic Functional Group Test

Nine specific reactivity groups can be distinguished by using this procedure. These tests are performed on all organic wastes except those shown to be negative for sulfur, nitrogen and phosphorus by the sodium fusion test and a negative ferrox test (see Figure 4-7).

4.1.7.3 Nitrogen-Containing Organic Functional Group Test

The tests for the seven reactivity groups in this subset are performed only if nitrogen is detected by the sodium fusion procedure (see Figure 4-8).

4.1.7.4 Sulfur-Containing Organic Functional Group Test

This procedure distinguishes the two reactivity groups contained within this subset (see Figure 4-9). If sulfur is shown to be absent in the sodium fusion procedure, this procedure need not be performed.

4.1.8 Inorganic Functionality Test

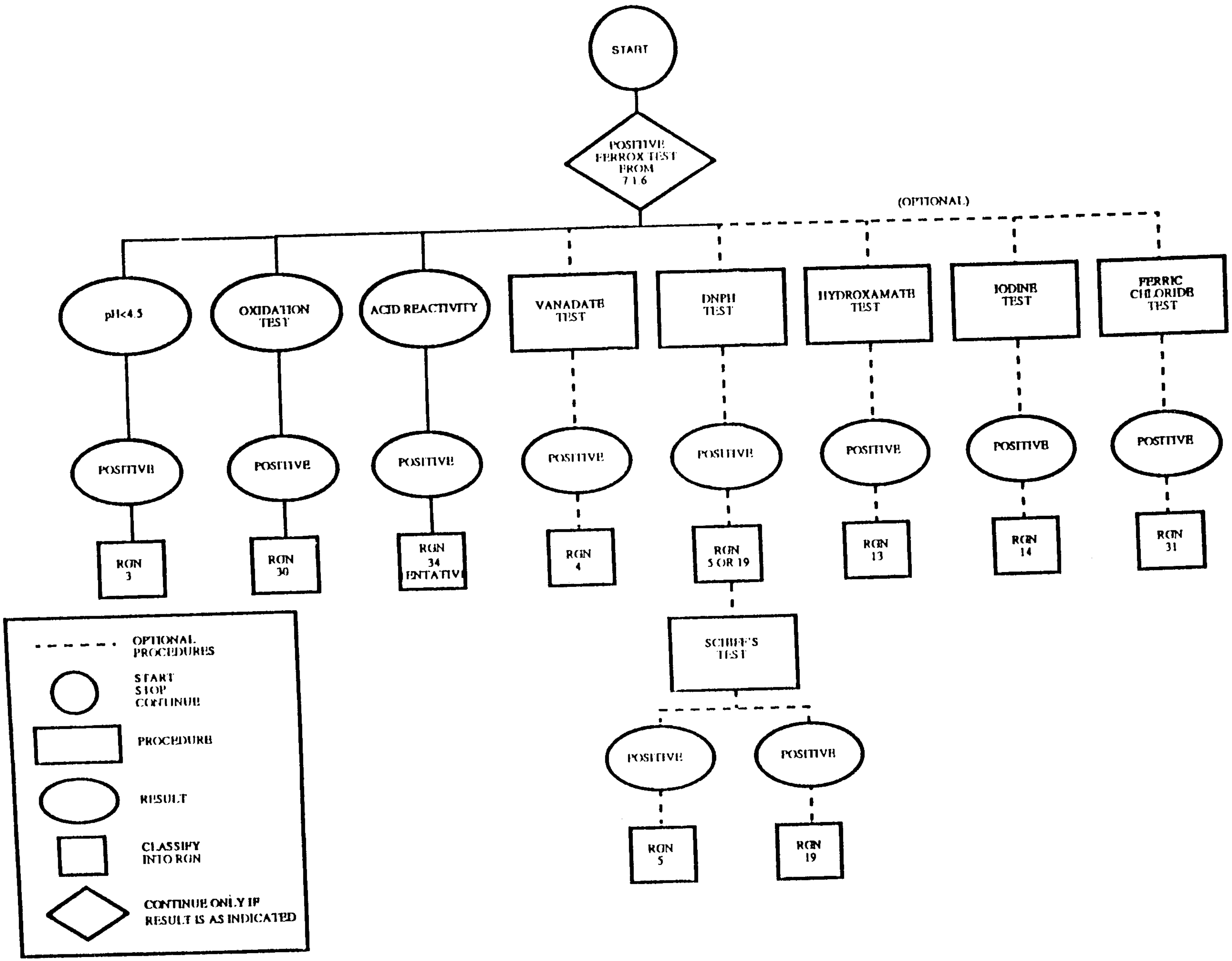
The presence of elemental metals, heavy metal compounds, halides, phosphates, and/or organic fluorides are confirmed by this procedure (see Figure 4-10). Additionally, semi-quantitative analyses can be performed in accordance with procedure RC-37s for selected parameters on aqueous and water soluble materials.

4.1.9 Geiger-Müller Counter Radiological Survey

Surface radioactivity is determined in the field using a Geiger Müller (G-M) counter as detailed in procedures ES&H 2.3.8 and 2.6.3. This will serve to indicate gross levels of contamination and determine the applicability of additional laboratory testing. If the GM survey

OXYGEN-CONTAINING ORGANIC FUNCTIONAL GROUP TEST FLOW CHART

FIGURE 4-7



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NITROGEN-CONTAINING ORGANIC FUNCTIONAL GROUP TEST FLOW CHART

FIGURE 4-8

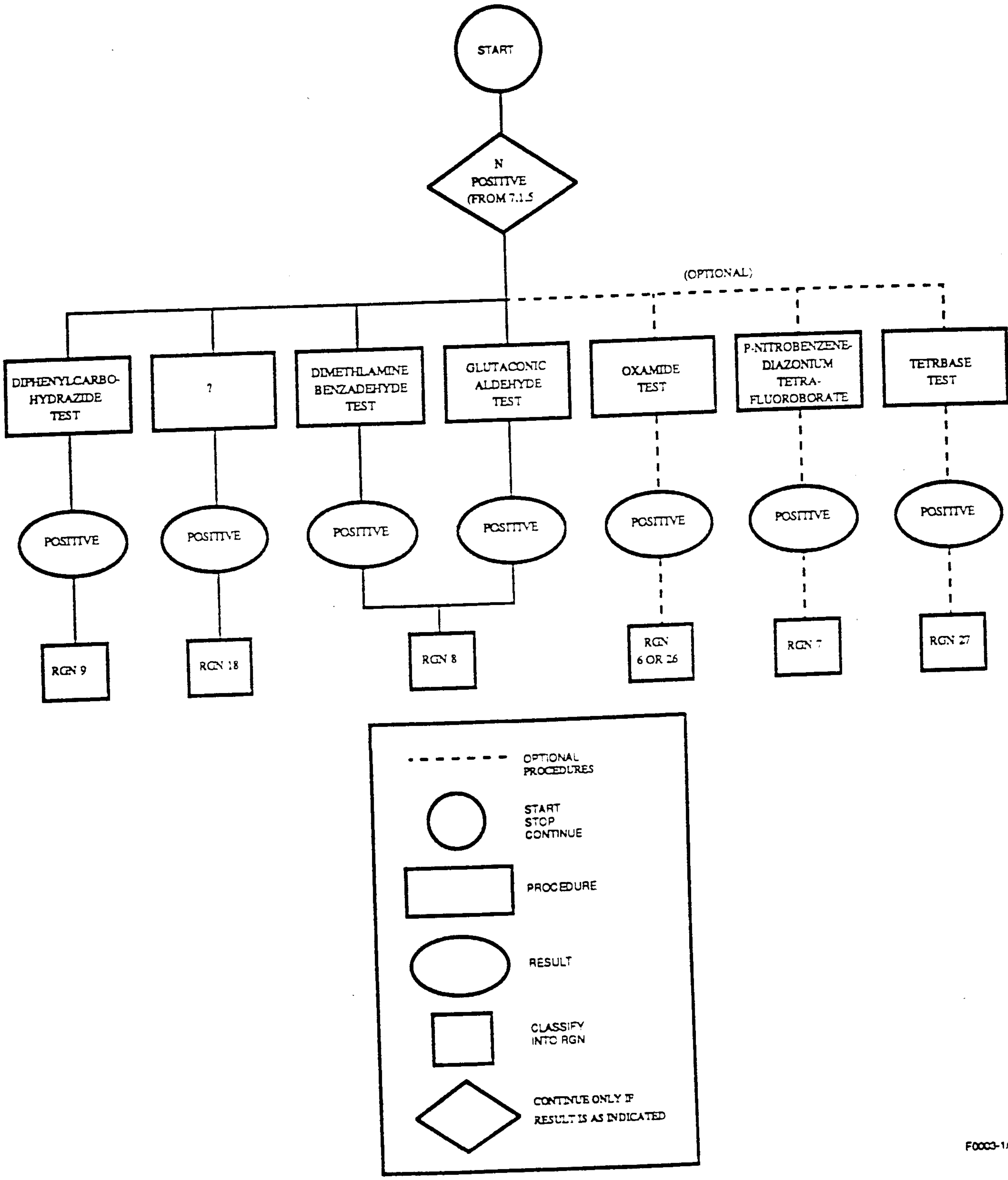

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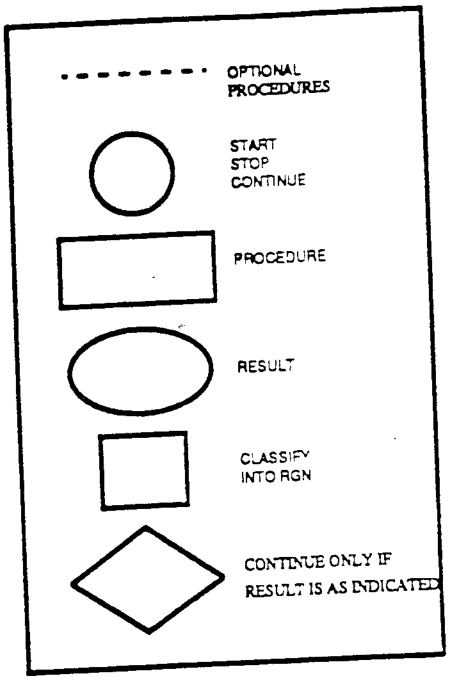
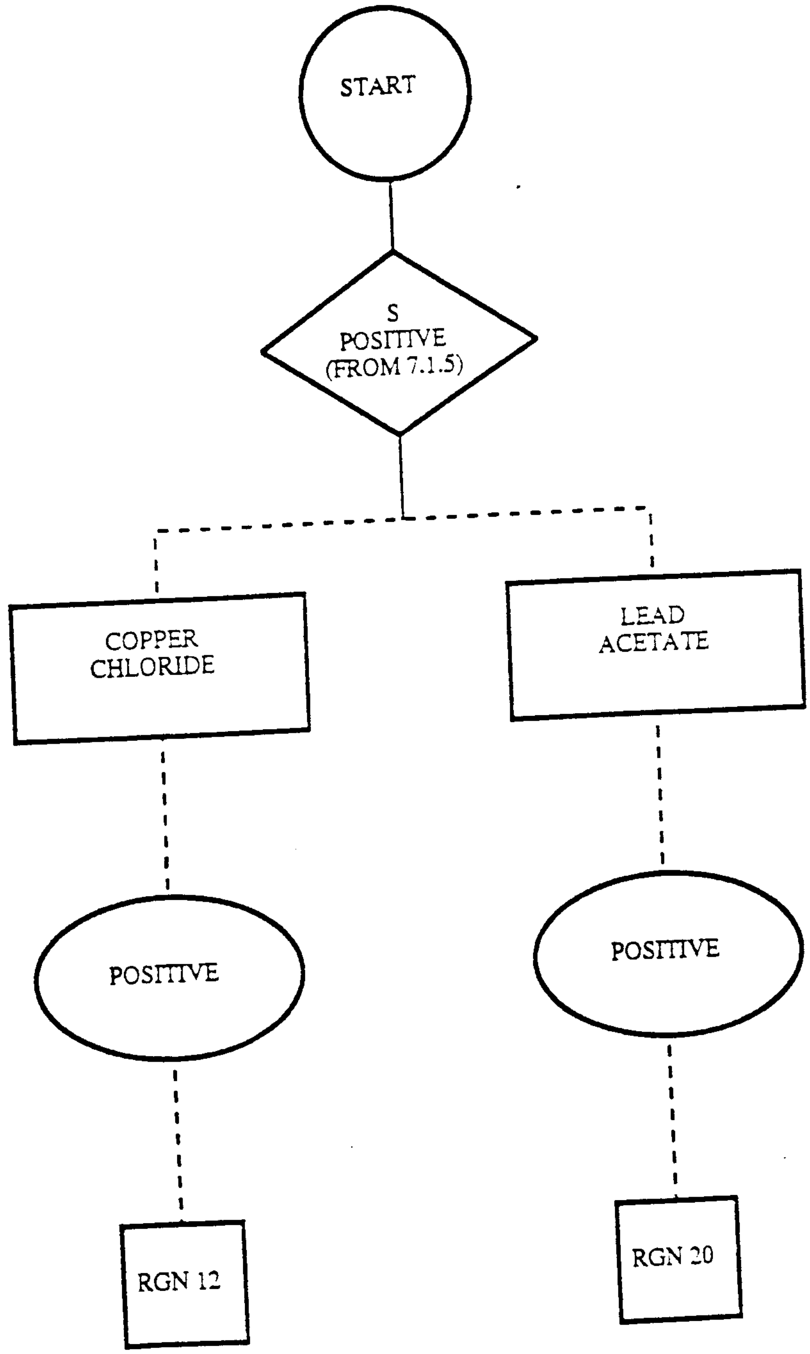
FIGURE 4-9

SULFUR-CONTAINING ORGANIC FUNCTIONAL GROUP TEST FLOW CHART





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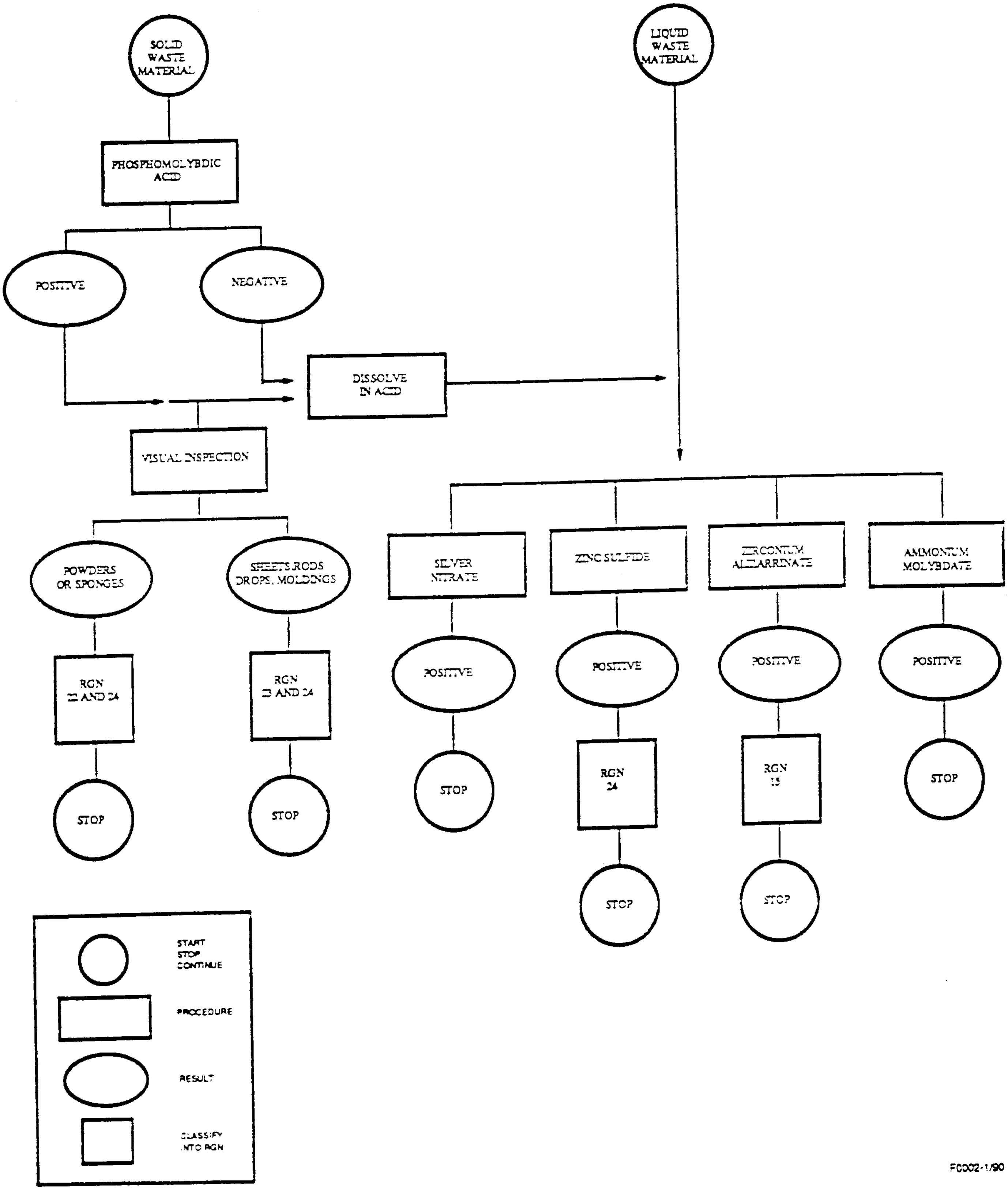
INORGANIC FUNCTIONALITY TEST FLOW CHART

FIGURE 4-10



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indicates activity in excess of natural background, no further actions are required. If the GM survey indicates only natural background, then a representative portion of the waste will be analyzed utilizing the GeLi detector in the WSSRAP laboratory as detailed in procedure ES&H 2.6.9s.

4.1.10 Visual Examination

Visual examination of waste materials will aid in consolidation and provide insight into the appropriateness of field or laboratory analysis.

4.1.11 Polychlorinated Biphenyls (PCBs)

This procedure works on the principle of chloride determination. PCBs, which contain chlorine, can be detected by this test; however, any other organic chlorine-containing compound will also be detected by this test and may cause a false positive result. All waste materials that yield a positive result shall be confirmed by a detailed laboratory analysis.

4.1.12 Flash Point

The flash point is necessary to determine regulatory classifications of organic liquids and to ensure safe handling and storage of flammable or ignitable materials.

4.1.13 Field Compatibility Determination

All materials will be verified to be compatible prior to consolidation to ensure employee safety and verity field analytical data. Prior to any consolidation, small representative portions of waste materials will be combined as indicated in Procedure RC-26s.

4.2 Laboratory Analyses

Quantitative analysis is performed in the laboratory to identify hazardous components present in wastes. The presence of listed substances must be determined to allow proper management of WSSRAP wastes.

Chemical analysis data will assist in the development of treatment and/or disposal options, development of burn plans for incinerable wastes, providing data requested by disposal facilities, and confirmation of field analysis data.

The analytical regime specified in this section is comprehensive and should be adequate to provide the information required. Should other preferable technologies evolve in the near future, they will be taken into consideration. Figure 4-11 details the decision process for determining appropriate analytical testing for organic materials and Figure 4-12 details the decision process of aqueous liquids and inorganic solids. The process of determining appropriate analytical testing is complex and requires a great deal of judgement on the part of the Waste Management Group. No strict analytical regime can be prescribed for any given classification but must be evaluated for each waste on a case-by-case basis.

4.2.1 Suspended Solids

Suspended solids can affect the handling and pumping characteristics of the waste during treatment and their measurement is used as a fundamental indicator of the suitability of the waste for various treatment or disposal options.

4.2.2 Total Metals

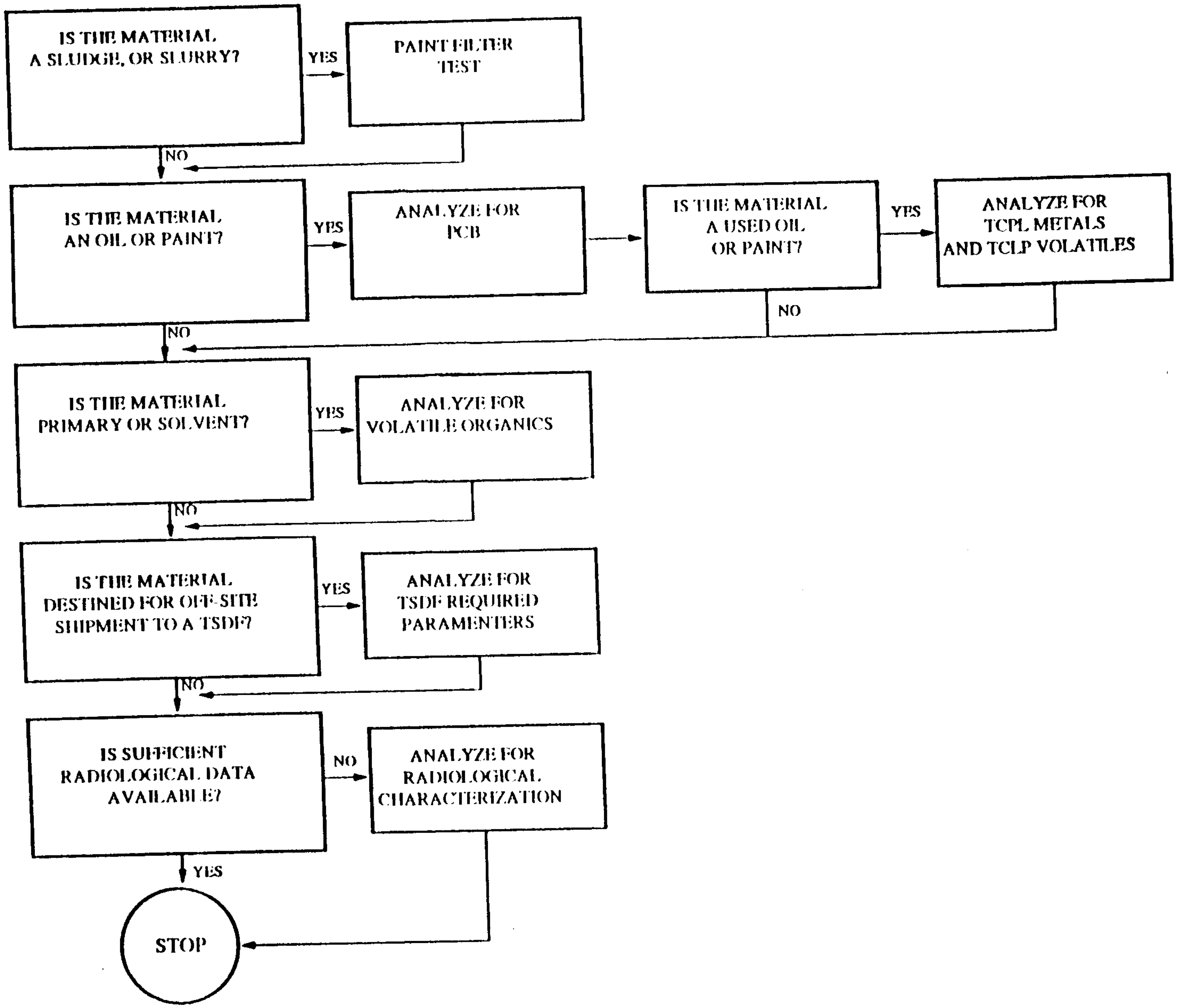
This analysis meets the requirements to identify hazardous metal constituents identified in Appendix VIII to 40 CFR 261 which is a prerequisite to treatment, storage and disposal facility (TSDF) acceptance for final treatment or disposal. TSDF Part B permits also specify limits on the level of heavy metals in the waste that the incinerator can accept to ensure that a release of toxic metals to the environment does not occur during incineration. Concentrations of total metals may also indicate the potential of a waste to be characteristically hazardous by the toxic characteristic leaching procedure (TCLP).

4.2.3 Volatile Organic Analysis by Gas Chromatography/Mass Spectroscopy (GCMS)

This analysis is designed to identify and quantify volatile organic analytes which appear on the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Hazardous Substance List (40 CFR Part 302.4 Table 302.4) of which the Appendix VIII substances are a subset. This data is also used to determine whether those wastes proposed for

FIGURE 4-11

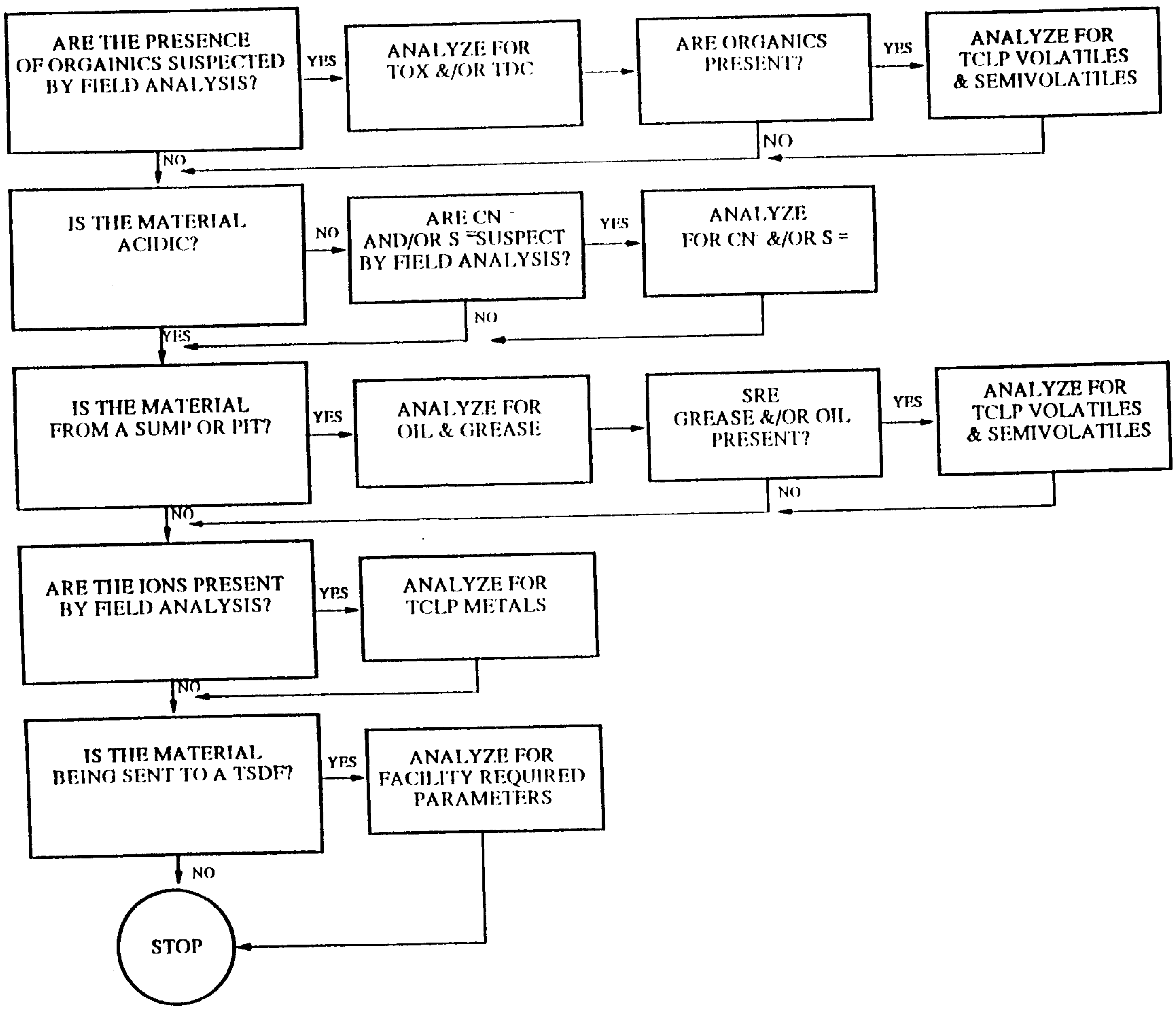
ORGANIC WASTE ANALYTICAL DECISION PROCESS



F0011-1/90

FIGURE 4 12

INORGANIC WASTE ANALYTICAL DESIGN PROCESS



F0010-1/90

incineration can be destroyed by the incineration process. This analysis can also be used to detect compounds that may cause the waste to be characteristically hazardous by TCLP and therefore require further analyses by TCLP.

4.2.4 Semi-Volatile Organic Analysis by Gas Chromatography/Mass Spectroscopy (GCMS)

An analysis for these compounds satisfies permit and regulatory requirements to identify organic components which appear on the Appendix VIII list in 40 CFR 261.

4.2.5 Moisture Content

Water content can be used to determine storage compatibility and handling requirements and to provide data for material balance calculations.

4.2.6 Specific Gravity

The specific gravity value is important in calculating material balance across a treatment process and to give a true value of the amount of materials being handled.

4.2.7 Ash Content

This information is important for evaluating wastes for potential slag and ash formation, to assess particulate loading, and to verify that the slag and ash handling system is adequate.

4.2.8 Heating Value

This data is used in determining the acceptability of a waste for incineration, and to ensure that the incinerator heat load is maintained at the proper operating range.

4.2.9 Corrosivity

A material's corrosivity to steel indicates the appropriate type of container to use to avoid incompatibilities and container failures and to dictate regulatory classification.

4.2.10 Elemental Analysis (Carbon, Nitrogen, Sulfur, Phosphorus, Fluorine, Chlorine, Bromine, and Iodine)

Knowledge of these parameters is necessary for determination of incinerator system conditions, computation of stoichiometric air requirements, and to ensure adequacy of pollution control equipment.

4.2.11 Reactivity (Cyanide or Sulfide)

The presence or absence of cyanide and sulfide must be known to assure safe handling and storage, and to determine if treatment to destroy or stabilize these compounds is warranted. Analysis of low pH (≤ 2) materials is unnecessary since, as a rule, materials with an acidic pH will have reacted and liberated any HCN and H^2S present and will not contain cyanide or sulfide.

4.2.12 Toxicity Characteristic Leaching Procedure (TCLP)

TCLP should be performed on all wastes and the solid created after stabilization of liquids and unknown wastes, if it is necessary to determine if the material meets the regulatory definitions of a characteristic waste or the requirements for land disposal in 40 CFR Part 268.

4.2.13 Total Organic Halide (TOX)

The data from this analysis can be used to screen aqueous wastes that may contain levels of halogenated organic contaminants that may not be detectable during field analysis and may need further organic constituent analysis.

4.2.14 Total Organic Carbon (TOC)

This procedure is used to screen aqueous wastes for low level organic contamination that may not have been detected during field analysis. It will also be used to determine if a more specific analysis for organic species may be required.

4.2.15 Paint Filter Test

This will provide information regarding the amount of free liquids that are present in the waste. This information can be used for insuring proper storage and secondary containment.

4.2.16 Radiological Characteristics

Knowledge of the concentration of uranium, thorium, and other appropriate radioactive isotopes is necessary to assure that the limits specified in any specific TSDF Part B or National Emissions Standards for Hazardous Air Pollutants (NESHAP) permit are not exceeded. This information is also for safe handling and storage.

4.2.17 Viscosity

Knowledge of the viscosity of a waste material will allow determination of the type of pump required to handle the waste as well as the need for blending the waste to achieve a more pumpable mixture.

4.2.18 Polychlorinated Biphenyls (PCBs)

The analysis will verify the presence or absence of PCBs and provide insight to the applicability of TSCA regulations to the management of the waste material.

4.2.19 Oil, Grease and Total Petroleum Hydrocarbons (TPH)

This analysis will be limited primarily to samples obtained from sumps and underground storage tanks and will be used to identify treatment or disposal options and to verify that cleanup and/or removal criteria are met.

4.2.20 Dioxin

Dioxin analyses will be performed on those wastes, such as wood, suspected of being treated with chemicals that may have been contaminated with dioxin. The presence of dioxin in a waste will greatly influence the disposal options available.

4.2.21 Asbestos

For materials suspected of asbestos contamination, knowledge of the asbestos content and asbestos type is required to ensure that the material is properly containerized and labeled in accordance with regulatory requirements.

4.2.22 Polyaromatic Hydrocarbons

An analysis for these compounds satisfies regulatory requirements to identify specific organic components that appear on the Appendix VIII list.

4.2.23 Nitroaromatics

Analysis for nitroaromatics will indicate the presence of potentially explosive compounds in soils or wastes that may have been contaminated as result of Weldon Spring Ordnance Works activities. Knowledge of the level of these contaminants is necessary to determine if cleanup criteria for the materials apply or have been met.

4.3 Recharacterization

Recharacterization of site generated wastes is required to verify that the concentration of constituents has not changed significantly, new constituents have not been added, or that the physical properties have not changed. Since the WSS is an inactive facility, recharacterization will not be required for the majority of wastes managed at this project. Wastes generated by site activities, such as field and radiological laboratory waste, will receive full characterization prior to placement into Building 434 for storage.

Other wastes such as purge and development water are generated from wells and areas where sufficient analytical data are maintained from required monitoring activities. Therefore, recharacterization can be evaluated based on data available from the previous quarter.

4.3.1 Fingerprint Screening

Fingerprint screening consists of selected tests that can be performed at the WSS to verify that the gross chemical composition of the waste has not changed significantly. For aqueous and inorganic wastes, these tests consist of pH, screening for oxidation potential, cyanide, sulfide, and metal ions. Organic materials are tested for the presence of water, sodium fusion, appropriate functional group, and flash point for liquids. The appropriate tests will be run on randomly selected drums of wastes stored in Building 434.

5 SAMPLE MANAGEMENT

Sample management begins as soon as the sample is collected and continues during the transportation to the laboratory, through the analytical phase, and culminates with the return of the sample to the Weldon Spring site (WSS).

As discussed previously, waste samples are collected in accordance with procedure RC-24s. Chain of custody is initiated at this time and documented in accordance with procedure ES&H 4.1.2a. Chain of custody is maintained throughout the packaging phase and custody is transferred to the analytical laboratory to allow for completion of the requested analyses.

All waste management samples must be assigned a unique identifier as follows:

WM-AAAA-BBBBBB-DDD

where

"WM" denotes that this sample is a waste sample taken for characterization purposes.

"AAAA" represents a four digit code denoting the sample location or original container identification.

For containerized wastes that have been assigned waste inventory tracking system (WITS) identification numbers, AAAA must be that number.

For bulk waste samples or containerized wastes that have not been assigned a WITS identification number, the following shall apply to the AAAA designation:

AAAA - PSXX for process sewer samples.
- SUXX for sump samples.
- SXXX for soil samples.
- HXXX for water samples.
- LXXX for oil samples.
- WXXX for swipe samples.
- CXXX for concrete samples.

- WDXX for wood samples.
- SSXX for sanitary sewer samples.
- UKXX for all other samples.

"BBBBBB" represents a six-digit number indicating the sample date (month/day/year).

"DDD" represents a letter denoting quality control status and is not required for all samples.

FD - field duplicate.
MS - matrix spike.
MSD - matrix spike duplicate.
TB - trip blank.
EB - equipment blank.
WB - distilled water blank.

The characteristics of the sample determine the packaging of samples for shipment to off-site laboratories. The *Site Consolidated Transportation Activity Manual* (SCTA) (MKF and JEG 1992c) provides guidance on the proper classification, packaging, labeling, and marking of samples.

The Site Shipping Officer (SSO) administers the shipping program and provides guidance and training to all Project Management Contractor (PMC) or Subcontractor personnel. The SSO also inspects sample shipments for compliance with site procedures and government regulations as well as upon return from off-site laboratories.

Samples returned from off-site laboratories are archived or disposed of in accordance with RC-22a.

6 WASTE CLASSIFICATION

The U.S. Environmental Protection Agency (EPA) identifies a hazardous waste as meeting the criteria shown in two sections in Part 261, 40 CFR. Subpart C outlines the waste's characteristic ignitability, corrosivity, reactivity, and toxic characteristic leaching procedure (TCLP) toxicity, and Subpart D specifically lists hazardous wastes by source or name.

Once a waste material is identified and characterized and found to be a hazardous waste, that hazardous waste must be correlated with a Department of Transportation (DOT) hazard class. A hazardous waste meeting the definition of more than one DOT hazard class shall be classed according to the DOT Hazard Precedence List (49 CFR 173.2).

Any waste material found to have a polychlorinated biphenyl (PCB) concentration greater than 50 ppm is regulated by the Toxic Substances Control Act (TSCA) and must be marked as required by 40 CFR 761 Subpart M.

Any waste material found to have uranium concentrations greater than background by a standard Geiger-Müller (G-M) counter shall be considered radioactive and labeled as such until detailed radiological characterization is completed. Once detailed radiological data are available, the material will be classified as defined by the Department of Transportation in 49 CFR Section 172.

7 RECORDKEEPING

In keeping with the intentions of the reporting and recordkeeping requirements of 40 CFR Part 262, complete documentation of all field and laboratory analyses will be required.

All field sampling and analytical data will be documented on a Weldon Spring Site Remedial Action Project (WSSRAP) Field Analysis Data Sheet.

Off-site laboratory documentation, when requested, will consist of all sample preparation logs, notebook pages, chromatograms (or other instrument printouts) and laboratory custody transfer records.

All field and laboratory data will be maintained on file at the WSSRAP by the Quality Assurance (QA) Department in accordance with QAPP-9 until completion of the project or as directed by the U.S. Department of Energy (DOE) or a minimum of 10 yr after the completion of remedial actions.

All movements of containerized wastes, whether on-site or off-site, will be entered into the Waste Inventory Tracking System (WITS) as detailed in procedure RC-13.

Where appropriate and applicable, photographs will be taken to document field observations. These will be taped to the field data sheet or kept in separate logs intended for this purpose, as necessary.

Data sheets that document methods and equipment used will be maintained during all sampling operations and will be consistent with all WSSRAP standard operating procedures and requirements outlined in SW-846. The required information for these data sheets is detailed in procedure RC-24s.

Data required by the selected treatment or disposal facility for disposal purposes will be made available to the facility in accordance with the facility's requirements. In many instances, this will require completion of a waste profile sheet or similar form required by the chosen facility which details the chemical and physical characteristics of the waste. All such paperwork will be completed by the Waste Management Group and forwarded to the facility with a representative sample of the waste if required or requested. Copies of any such paperwork will be maintained on file in the Environmental Compliance Departmental files.

8 ACRONYMS

AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BADT	best available disposal technology
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLP	Contract Laboratory Program
CRF	Code of Federal Regulations
CWA	Clean Water Act
DNT	dinitrotoluene
DOE	United States Department of Energy
DOT	United States Department of Transportation
DQO	data quality objective
EMSL-LV	Environmental Monitoring and Support Laboratory, Las Vegas
EPA	United States Environmental Protection Agency
EPP	emergency plans and procedures
ES&H	Environmental Safety and Health
FADS	Field Analysis Data Sheet
FUSRAP	Formerly Utilized Sites Remedial Action Program
GCMS	gas chromatography/mass spectroscopy
G-M	Geiger Müller
HCP	Hazard Communication Plan
HEPA	high efficiency particulate air
HSL	Hazardous Substance List
LDR	Land Disposal Restriction
MDNR	Missouri Department of Natural Resources
MSA	material staging area
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	United States Nuclear Regulatory Commission

OSHA	Occupational Safety and Health Administration
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PMC	Project Management Contractor
PPE	personal protective equipment
PPERM	Personal Protective Equipment Requirements Manual
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RMMA	radioactive materials management area
RQ	reportable quantity
RSFMP	Remote Surplus Facility Management Program
SARA	Superfund Amendments and Reauthorization Act
SCTA	Site Consolidated Transportation Activity
SDWA	Safe Drinking Water Act
SFMP	Surplus Facility Management Program
SSO	Site Shipping Officer
TCLP	toxic characteristic leaching procedure
TNT	trinitrotoluene
TOC	total organic carbon
TOX	total organic halide
TPH	total petroleum hydrocarbons
TSA	temporary storage area
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
WITS	Waste Inventory Tracking System
WME	Waste Management Engineer
WMG	Waste Management Group
WSCP	Weldon Spring Chemical Plant
WSOW	Weldon Spring Ordnance Works
WSVP	Weldon Spring vicinity property
WSS	Weldon Spring site
WSSRAP	Weldon Spring Site Remedial Action Project
WSQ	Weldon Spring Quarry
WSCP	Weldon Spring Chemical Plant

9 REFERENCES

9.1 Regulations

40 CFR Part 61, Subpart M - *National Emission Standard for Asbestos*

40 CFR Part 261 - *Identification and Listing of Hazardous Wastes*

40 CFR Part 262 - *Standards Applicable to Generators of Hazardous Wastes*

40 CFR Part 264 - *Standards for Operators and Owners of Hazardous Waste Treatment, Storage, and Disposal Units*

40 CFR Part 268 - *Land Disposal Restrictions*

40 CFR Part 302 - *Designation, Reportable Quantities, Notifications*

40 CFR Part 761 - *PCBs Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions*

49 CFR Part 17 2 - *Hazardous Materials Tables and Hazardous Materials Communications Regulations*

49 CFR Part 173 - *Shippers - General Requirements for Shipments and Packaging*

10 CSR 25-11 - *Missouri State Regulations for Waste Oil*

29 CFR Part 1910.1450 - *Occupational Exposure to Hazardous Chemicals in Laboratories*

9.2 Federal Documents

EPA, see U.S. Environmental Protection Agency

U.S. Department of Energy Oak Ridge Gaseous Diffusion Plant, 1986. *Waste Acceptance Plan and Analytical Protocol for the K-1435 Toxic Substance Control Act Incinerator*, Rev. 0. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, Missouri. October.

U.S. Department of Energy Order 5400.5 - *Radiation Protection of the Public and Environment*

U.S. Environmental Protection Agency SW 846, 1986. *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. 3rd Edition.*

U.S. Environmental Protection Agency 600/4-79-020, 1981. *Chemical Methods for the Examination of Waters and Wastes*. Cincinnati, Ohio.

U.S. Environmental Protection Agency, 1982. *Resource Conservation and Recovery Act Inspection Manual.*

9.3 Project Management Contractor Plans

MK-Ferguson Company and Jacobs Engineering Group, 1988. *Phase I Chemical Soil Investigation Data Report for the Weldon Spring Chemical Plant/Raffinate Pits*, DOE/OR-21548-016. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. January.

MK-Ferguson Company and Jacobs Engineering Group, 1989. *Weldon Spring Site Remedial Action Project Safety and Health Manual.*

MK-Ferguson Company and Jacobs Engineering Group, 1991a. *Laboratory Chemical Hygiene Plan*, Rev. 0. DOE/OR/21548-184. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project. St. Charles, MO.

MK-Ferguson and Jacobs Engineering Group, 1991b. *Building Characterization Work Plan*, Rev. 0. DOE/OR/21548-185. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, Missouri. April.

MK-Ferguson Company and Jacobs Engineering Group, 1991c. *Environmental Quality Assurance Plan*, Rev. 0. DOE/OR/21548-240. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project. St. Charles, MO. November.

MK-Ferguson Company and Jacobs Engineering Group, 1992a. *Waste Management Plan*, Rev. 3. DOE/OR/21548-166. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. February.

MK-Ferguson Company and Jacobs Engineering Group, 1992b. *Waste Management Training Plan*, Rev. 2. DOE/OR/21548-149. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. October.

MK-Ferguson Company and Jacobs Engineering Group, 1992c. *Site Consolidated Transportation Activity Manual*, Rev. 0. DOE/OR/21548-309. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. In press.

9.4 Environmental Compliance Department Procedures

RC-4s *Field Laboratory Operating Procedure*
RC-9s *Containerized Waste Labeling Procedure*
RC-13 *Waste Inventory Tracking Procedure*
RC-18a *Management of Site Generated Waste*
RC-20a *Container Management Procedure*
RC-21s *Field Analytical Procedure*
RC-22a *Management of Samples Returned from Off-site Laboratories*
RC-24s *Waste Sampling Procedure*
RC-26s *Field Compatibility Procedure*
RC-31a *Environmental Monitoring Data Validation*
RC-37s *Supplemental Analysis Procedure*
RC-38s *Environmental Compliance Logbook Procedure*

RC-32s *Determining the Radioactive Component of a Hazardous Waste*

9.5 ES&H Department Procedures

ES&H 2.3.8 *Contamination Survey*
ES&H 2.6.3 *GM Detector Calibration, Operation and Usage*
ES&H 2.6.9s *Instructions for Calibration and Operation of the Computer Interface Multi-Channel Analyzer with a High Purity Germanium Detector*
ES&H 4.1.2 *Chain of Custody*
ES&H 4.3.1s *Surface Water Sampling*
ES&H 4.4.5 *Soil and Sediment Sampling*
ES&H 4.9.1 *Environmental Monitoring Data Verification*
ES&H 6.2.1 *Hazardous Waste Site Health and Safety Training*

9.6 Quality Assurance Procedures

QAPP-1 *Quality Assurance Program Plan Organization*
QAPP-9 *Quality Assurance Records*
QAPP-10 *Audits*
SQA-2a *Quality Assurance Surveillance*

9.7 Other

Acurex Corporation, 1984. *Design and Development of a Hazardous Waste Reactivity Testing Protocol*. Mountain View, CA.

Appendix A
TABLE 1 K-1435 Waste Acceptance Plan

TABLE 1 Waste Analysis Parameters and Methods

Parameter	Method	References
Chlorine	1. A004	1. "Sampling and Analysis Methods for Hazardous Waste Incineration," EPA-600/8-84-002, February 1984
	2. EPA-9020	2. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods; USEPA SW-846, 3rd Edition
	3. ASTM-2361	3. ASTM D-2361-85; "Test Method for Chlorine in Coal"
	4. [a]ASTM-3286/ EPA-300.00	4. ASTM D-3268-84; "Test Method for Gross Calorimetric Value of Coal and Coke by the Isothermal Bomb Calorimeter"/"The Determination of Inorganic Anions in Water by Ion Chromatography," EPA-600/4-84-017, March 1984
Sulfur	1. ASTM-129	1. ASTM D-129-64 (1978); "Test Method for Sulfur in Petroleum Products (General Bomb Method)"
	2. [a]ASTM-3286/ EPA-300.00	2. ASTM D-3286-84; "Test Method for Gross Calorimetric Value of Coal and Coke by the Isothermal Bomb Calorimeter"/"The Determination of Inorganic Anions in Water by Ion Chromatography," EPA-600/4-84-017, March 1984
Phosphorus	1. A021 (ICAP)	1. "Sampling and Analysis Methods for Hazardous Waste Incineration," EPA-600/8-84-002, February 1984.
	2. EPA-6010 (ICAP)	2. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods; USEPA SW-846, 3rd Edition
Fluorine	1. ASTM-3761	1. ASTM D-3761-84; "Test Method for Total Fluorine on Coal by the Oxygen Bomb Combustion/Ion Selective Electrode Methods"
	2. [a]ASTM-3286/ EPA-300.00	2. ASTM D-3286-84; "Test Method for Gross Calorimetric Value of Coal and Coke by the Isothermal Bomb Calorimeter"/"The Determination of Inorganic Anions in Water by Ion Chromatography," EPA-600/4-84-017, March 1984
Ash (Liquid)	1. A001	1. "Sampling and Analysis Methods for Hazardous Waste Incineration," EPA-600/8-84-002, February 1984
	2. ASTM-482	2. ASTM D-482-80; "Test Method for Ash from Petroleum Products"

TABLE 1 Waste Analysis Parameters and Methods (Continued)

Parameter	Method	References
Ash (Solid)	1. A001	1. "Sampling and Analysis Methods for Hazardous Waste Incineration," EPA-600/8-84-002, February 1984
	2. ASTM-3174	2. ASTM D-3174-82; "Test Method for Ash in the Analysis Sample of Coal and Coke from Coal"
Water	1. ASTM-1533	1. ASTM D-1533-83; "Test Method for Water in Insulating Liquids (Karl Fischer Method)"
	2. ASTM-1064	2. ASTM E-1064-85; "Test Method for Water in Organic Liquids by Colorimetric Karl Fischer Titration"
Cyanide	1. EPA-335.2	1. "Methods for Chemical Analysis of Water and Wastewater," EPA-600/4-79-020, March 1983
PCB	1. EPA-8080	1. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods, USEPA SW-846 2nd Edition
Uranium (Total)	1. Colorimetric	1. TP-0803; "Colorimetric Uranium," ORGDP Analytical Chemistry Department Technical Procedures Manual
	2. Fluorometric	2. TP-0803; "Fluorometric Uranium," ORGDP Analytical Chemistry Department Technical Procedures Manual
	3. EPA-6010	3. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods,: USEPA SW-846 3rd Edition
235U Assay	1. Thermal Ionization Mass Spectrometric Method	1. TP-2101; "Thermal Ionization Mass Spectrometric Method," ORGDP Analytical Chemical Department Technical Procedures Manual
Specific Gravity	1. ASTM-3142	1. ASTM D-3142-84; "Test Method for Specific Gravity or API Gravity of Liquid Asphalts by Hydrometer Method"
Viscosity	1. ASTM-445	1. ASTM D-445-83; "Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)"
Flash Point (F)	1. EPA-1010	1. "Test Methods for Evaluating Solid Waste," USEPA SW-846, 2nd Edition

TABLE 1 Waste Analysis Parameters and Methods (Continued)

Parameter	Method	References
Suspended Solids	1. EPA-160.1	1. "Methods for Chemical Analysis of Water and Wastewater," EPA-600/4-79-020, March 1983
Size (wt% >20 mesh)	1. ASTM-310	1. ASTM D-310-69(1989); "Test Method for Size of Anthracite"
pH (Liquid)	1. EPA-9040	1. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods, USEPA SW-846, 3rd Edition
pH (Organics)	2. EPA-9041	2. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods, USEPA SW-846, 3rd Edition
pH (Solids)	3. EPA-9045	3. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods, USEPA SW-846, 3rd Edition
Heating Value Btu/lb	1. ASTM-3286	1. ASTM D-3286-84; "Test Method for Gross Calorific Value of Coal and Coke by the Isothermal Bomb Calorimeter"
	2. ASTM-240	2. ASTM D-240-76(1980); "Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter"
Number of Phases	1. Visually	
Metals by ICP (A1, Be, Cd, Fe, Li, Na, Pb, Cu, Mg, Mn, Ni, Ti, Zn)	1. EPA-6010	1. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods, USEPA SW-846, 3rd Edition
Metals by AA (As, Se)	1. EPA-7060	1. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods, USEPA SW-846, 3rd Edition
Mercury by Cold Vapor AA	1. EPA-7470/7471	1. "Test Methods for Evaluating Solid Waste," Physical and Chemical Physical and Chemical Methods, USEPA SW-846, 3rd Edition

TABLE 1 Waste Analysis Parameters and Methods (Continued)

Parameter	Method	References
Technetium-99	1. EC-186	1. EC-186; "Technetium-99 in Water (Radiochemical Method)," Martin Marietta Energy Systems Env. and Effluent Analysis Manual
	2. EC-260	2. EC-260; "Technetium-99 in Air Filters (Radiochemical Method), "Martin Marietta Energy System Env. and Effluent Analysis Manual
	3. EC-355	3. EC-355; "Technetium in Sediment and Soil (Radiochemical Method)" Martin Marietta Energy System Env. and Effluent Analysis Manual
Corrosivity Toward Steel	1. EPA-1110	1. "Test Methods for Evaluating Solid Waste," Physical and Chemical Methods, USEPA SW-846, 2nd Edition
Neptunium	1. TP-1635	1. TP-1635; "Neptunium, Alpha Activity," ORGDP Analytical Chemical Department Technical Procedures Manual
Plutonium	1. TP-1635	1. TP-1635; "Plutonium, Alpha Activity," ORGDP Analytical Chemical Department Technical Procedures Manual
Thorium	1. TP-1635	1. TP-1635; "Thorium, Alpha Activity," ORGDP Analytical Chemical Department Technical Procedures Manual
Cesium	1. EC-134	1. EC-134; "Gamma-Ray Emitting Nuclides (Nondestructive Spectrometric Method)" Martin Marietta Energy Systems Env. and Effluent Analysis Manual
Tritium	1. EC-189	1. EC-189; "Tritium in Water" (Radiochemical Method) Martin Marietta Energy Systems Env. and Effluent Analysis Manual
Alpha/Beta	1. EPA-900	1. EPA-600/4-80-32; August 1980 "Prescribed Procedure for Measurement of Radioactivity in Drinking Water"
Gamma Activity	1. EC-134	1. EC-134; "Gamma-Ray Emitting Nuclides (Nondestructive Spectrometric Method)" Martin Marietta Energy Systems Env. and Effluent Analysis Manual

a ASTM-2361, ASTM-3286, ASTM-3761, and ASTM-129 all use the bomb calorimeter for sample preparation. Therefore, the solution obtained in ASTM-3286 to determine the heating value can also be used with EPA Method 300.00, "The Determination of Inorganic Anions in Water by Ion Chromatography," to determine chlorine, sulfur, and fluorine.

IRA-500-502

IRA-500-503

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

September 03, 1987

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

Enclosed is the information regarding disposal of containerized chemicals from the Weldon Spring Site, which we agreed upon in our telephone conference on July 24, 1987.

The site contains 4,000 containers holding about 5,000 gallons of liquids and 2,500 cubic feet of solids of various chemicals, some of which are classified as hazardous. Many of the containers are deteriorating. This creates both a safety hazard for site personnel and a threat to the environment. Therefore, we plan to dispose of these materials.

The enclosed index lists three (3) attachments, including an inventory of containerized chemicals, locations of containers and specifications for the work. If you have any questions, please contact Jim Coyne of PEER Consultants, our support services contractor, at (314) 441-8472.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR

FILE NUMBER: ____________

Attachment No. 1

INTERIM MEASURE

CONTAINERIZED WASTE HANDLING, TRANSPORT, AND DISPOSAL

SUMMARY

The task consists of handling and stabilization, transporting to an EPA approved disposal facility and disposal of hazardous and non-hazardous wastes. Approximately 5,000 gallons of liquids and 2,500 cubic feet of solids are contained in 4,000 containers inside and outside of buildings on the Weldon Spring Chemical Plant site.

For those wastes which exhibit radiation levels that are statistically significant above background, those wastes will be segregated and stored in an onsite interim storage area.

The waste containers are deteriorating. The containers are scattered throughout the Weldon Spring Chemical Plant site (see Attachment No. 2 - Technical Specification with Attachments 1, 2, and 3). This situation creates a hazard to the health and safety of onsite workers and a threat to the environment.

We propose to dispose of all non-radiologically contaminated wastes at one or more EPA approved hazardous waste disposal facilities in compliance with 40 CFR 264-265 and 268 standards and regulations. Off-site transportation of this waste will be in compliance with 49 CFR 172-179, 49 CFR 387 (46 FR 30974, 47033), DOT-E 8876, and 40 CFR 262 and 263 regulations and standards.

We propose to consolidate and temporarily store all radiologically contaminated waste in Building 406 as an interim remedial action measure.

LIST OF ATTACHMENTS

Attachment 1: Interim Measures - Containerized Waste Handling, Transport, and Disposal - Summary

Attachment 2: Technical Specifications - 3589-SC-WP056 Containerized Waste Handling, Transport, and Disposal with Site Maps and Attachment 1 (Chemical Plant Containerized Chemical Inventory), Attachment 2 (Chemical Plant Fire Extinguisher Inventory), Attachment 3 (Locations of Wastes)

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United States Department Of Energy

SUPERCEDED

SPECIFICATION FOR

SUPERCEDED

CONTAINERIZED WASTE HANDLING, TRANSPORT, AND DISPOSAL

SUBCONTRACT NO. 3589-SC-WP-056

MK-FERGUSON COMPANY

WELDON SPRING SITE REMEDIAL ACTION PROJECT

ST. CHARLES, MISSOURI

APPROVED		
	NAME	DATE
PREPARED BY	John Zimmerman / tkd	8/14/87
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CONST./OP'S MGR.	[illegible] For	8/17/87

FILE NUMBER: ______________

WSSRAP

Weldon Spring Site Remedial Action Project

3589-SC-WP056

SPECIFICATIONS FOR

CONTAINERIZED WASTE HANDLING, TRANSPORT, AND DISPOSAL

1.0 LOCATION

This project is located at the Weldon Spring Chemical Plant (WSCP) which is situated approximately two miles southwest of Weldon Spring on Highway 94 South in St. Charles County, Missouri (see Figure 1.1). The major structures at the WSCP are shown on Figure 1.2.

2.0 SCOPE

Selected containerized chemicals and materials (hereafter referred to as containerized wastes) which include liquids, solids, gases, sediments and sludges contained in surface and subsurface storage tanks, process vessels, drums, fuel tanks, laboratory hoods and containers, gas cylinders, fire extinguishers, batteries, bags, boxes, bottles, cans, jars, and other miscellaneous containers have been identified for removal from the WSCP by the Contractor for the Weldon Spring Site Remedial Action Program (WSSRAP).

The Contractor estimates that the following volume percentages are representative of the waste categories present at the WSCP which will require handling by the Subcontractor:

Waste Category	Volume Percentage
Hazardous wastes	55
Non-hazardous wastes	45
*Radiologically contaminated wastes	5

Subcontractor will be responsible for the handling of these materials onsite, and their transfer/consolidation to the WSSRAP interim storage facility located in Building 406. The Subcontractor will not be responsible for any offsite handling, transport, or disposal of the WSCP radiologically contaminated containerized wastes.

*Approximately 5 percent of the WSCP containerized wastes have been identified as being radiologically contaminated.

During a contractor performed containerized waste inventory approximately 310 individual container groups were identified. In these 310 groups, there are approximately 4,000 individual containers. The Contractor estimates that there are approximately 5,000 gallons of liquids and approximately 2,500 cubic feet of solids included in the 4,000 containers. Many of the containers were found to be empty or have partially full contents.

Based on the contractor inventory the following waste volume estimates are anticipated for Subcontractor handling, transport, and disposal:

Category	Volume
Organic liquids, solvents, lubricants	4,500 gal.
Tar and asphalt liquids	250 gal.
Tar and asphalt solids	50 cu. ft.
Aqueous acids (pH <2.0)	100 gal.
Aqueous alkalines (ph >12.0)	150 gal.
Metals (magnesium scrap, metal powders, etc.)	600 cu. ft.
PCB contaminated liquids (50-500 ppm)	120 gal.
PCB materials (>500 ppm)	125 gal.
Laboratory pack liquids	200 gal.
Laboratory pack solids	70 cu. ft.
Strong oxidizers	300 cu. ft.
Strong reducing agents	225 cu. ft.
Fire extinguishers	525 units
Automotive or industrial batteries	258 units
Unknown solids	1,000 cu. ft.

Attachments 1 and 2 provide a general description as to the location, number, and type(s) of containers to be handled and the containerized waste to be removed from the WSCP. Attachment 3 provides figures which detail the locations of the selected containerized wastes at the WSCP.

During the containerized waste inventory, the contractor collected approximately 50 samples of selected materials which were analyzed for ignitability, corrosivity, and PCB content. The results of these analyses for all samples collected are reported in the "Comments" column of Attachment No. 1.

The Subcontractor shall be accompanied to each location by the Contractor Representative(s) who will also provide radiological monitoring during the Subcontractors performance of Scope of Work Subsection 2.1 activities listed below.

The following activities will be performed on the selected containerized wastes to satisfy this Scope of Work to be performed under this subcontract.

2.1 Handling and Stabilization

The Subcontractor shall supply all equipment, materials, labor, supervision and services necessary to handle the selected containerized wastes at the WSCP. Handling shall include the preparation, relocation, staging, opening, sampling, laboratory analysis for compatibility and disposal, stabilization, bulking, repacking and/or recontainerization, and compaction of empty containers.

For those designated containerized wastes which have previously been identified by the Contractor, or those which are identified during the Subcontractors performance of the Scope of Work in this Subsection, which exhibit radiation levels that are statistically significant above background, the Subcontractor will be required to segregate and relocate those containerized wastes to contractor designated onsite interim storage area located in Building 406.

For those storage vessels, tanks, drums, and other containers which have not previously been evaluated by the Contractor, but are included in the Attachment 1 inventory, the Subcontractor shall be required to open and/or inspect the inside of the container to evaluate the presence of waste materials which will require Subcontractor handling.

For those fire extinguishers identified in Attachment 2, the Subcontractor shall be responsible for their collection, pressure release and discharge of contents, and the handling of the released contents and empty casings.

2.2 Transport

The Subcontractor shall supply all equipment, materials, labor, supervision, and services necessary to transport those containerized wastes identified in Scope of Work, Subsection 2.1 off-site to an EPA approved disposal facility. Transport shall include the packaging, labeling, marking, manifesting, placarding, and off-site transport of those designated containerized wastes in compliance with 49 CFR 172-179, 49 CFR 387 (46 FR 30974, 47033), DOT-E 8876, and 40 CFR 262 and 263 regulations and standards.

2.3 Disposal

The Subcontractor shall be responsible for and shall provide for all equipment, materials, labor, supervision, and services necessary for the proper disposal of those containerized wastes identified in Scope of Work, Subsections 2.1 and 2.2. Proper disposal shall include the disposal of these containerized wastes at one or more EPA approved hazardous waste disposal facilities in compliance with 40 CFR 264-265 and 268 standards and regulations.

3.0 REQUIREMENTS

3.1 Permits and Licenses

The Subcontractor will obtain, provide, and be responsible for all permits and licenses which are required to perform the Scope of Work, Subsections 2.1, 2.2 and 2.3, and shall comply with and be responsible for all federal, state, and local regulations, including but not limited to the following: The Hazardous Waste Regulations defined by 40 CFR 261 - the Resource Conservation and Recovery Act (RCRA); the Hazardous Substance Regulations defined by 40 CFR 300.6 under the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA); and the Interim Final Rule for Hazardous Waste Operations defined by 29 CFR Part 1910 Subpart H - under the Occupational Safety and Health Act (OSHA) - General Industry Standards.

Documented proof of compliance shall be provided to the Contractor Representative(s) prior to the onset of site activities.

3.2 Work Plan

The Subcontractor shall develop a detailed work plan which will be submitted to the Contractor Representative(s) for review and approval prior to the start of on-site activities identified in Scope of Work, Subsection 2.1. This work plan shall include, but not be limited to, the following topics:

- Site preparation requirements
- Container relocation, staging procedures
- Container opening procedures and methodology
- Container sampling procedures, methodology and strategy
- Sample analysis procedures and methodology
- Compatibility testing procedures and methodology
- Bulking, overpacking, and/or recontainerization procedures
- Quality Assurance plans
- Contingency plans
- Health and Safety plans

The Contractor Representative(s) will review the Subcontractor work plan to ensure compliance with applicable WSSRAP programs. The Subcontractor shall insure that all sampling, analytical, compatibility/bulking, and packing procedures comply with federal, state, and local requirements for off-site transport (as described in Scope of Work, Subsection 2.2) and disposal (as described in Scope of Work, Subsection 2.3). Figure 3-1 provides an example of the Contractors - Containerized Chemical Contents Identification form which may be used by the Subcontractor to document sample contents for compatibility and disposal.

A copy of all containerized waste laboratory analyses will be provided to the Contractor for review and inspection, as the data becomes available.

3.3 Site Preparation

The Subcontractor shall be responsible for all initial site preparation and set up areas required for the performance of the Scope of Work, Subsections 2.1 and 2.2. The number and location of support facilities, special operating areas, or temporary storage areas needed may include but may not be limited to the following:

- o Staging areas
- o Container opening area(s)
- o Waste consolidation, loading areas
- o Interim storage areas
- o Equipment and personnel decontamination areas
- o Drum crushing area
- o Mobile laboratory, and
- o Administration/office area(s)

3.4 <u>Containerized Waste Access</u>

The Subcontractor shall be responsible for the removal of various obstacles, including materials, objects, and equipment, which impede access to the handling of containerized wastes required for the performance of the Scope of Work, Subsection 2.1. A summary of the buildings and/or areas where access difficulty may be encountered, are listed below.

- o Building 101 (Sampling Plant) - This is a multiple story building which is empty. Containerized wastes such as fire extinguishers, are located on each of the floors. Access to each floor is by inside stairs.

- o Building 103 (Digestion/Denitration Plan) - This is a multiple story building. Much of the building is empty. Containerized wastes i.e. fire extinguishers, are located on each of the floors. Access to each floor is by inside stairs.

- o Building 105 (Extraction Plant) - This is a multiple floor building. The building is empty. One fire extinguisher is located on the 2nd floor on the south side. Access to this floor is from outside stairs.

- o Building 108 (Nitric Acid Recovery) - No containerized wastes are located inside the building. Fire extinguishers are located outside the building. Brick flooring around the outside of the building is broken and caving in some areas.

- Building 201 (Green Salt Plant) - This is a multiple story building which still contains its original equipment contents. Containerized wastes were found on all floors; however, the majority of the containers on upper floors were fire extinguishers. Access to each floor is by inside stairs.

- Building 202 (Hydrofluoric Acid/Ammonia Tanks) - This area consists of three outside and five inside above ground storage tanks. Tank access is by outside stairs to the top of tanks/building roof. Each tank has an access port located on the top, east end of the tank. The Contractor has opened three of these tanks, each of which were found to be empty.

- Building 301 (Metal Plant) - This multiple story building still contains it original equipment. Contaminated materials and equipment such as lathes, milling machines, and conveyers, etc. were placed in rows. Smaller pieces of equipment, tools, and small motors, etc., were placed in 55 gallon drums and stacked two-drum high. Other contaminated equipment was stacked on top of the drums to help support the cocoon structures. The drums and other equipment and machinery have been covered with a thin fiber mesh and then sprayed with a one (1) inch thick layer of hard setting polyurethane foam. Thirty-four (34) of the cocoons exist. Thirteen (13) of the cocoons have been partially opened by the Contractor and twenty-eight (28) containers were located. The Subcontractor shall be responsible for the complete removal and disposal of the cocoon structures. A table showing the approximate size of each cocoon is shown in Figure A3-8A. The 28 containers are also included in the subcontract. Inventory, handling, identifying, transporting, and disposal of an additional containers inside these cocoons following the specification stated in this Scope of Work will be addressed by a Change Order.

- Building 302 (Magnesium Building) - This is a single story building which still contains its original equipment contents. Access to some containers may be hindered by equipment.

- Building 401 (Boiler House) - This is a multiple story building which still contains its original equipment contents. Containerized wastes were found on all floors; however the majority of the containers on the upper floors were fire extinguishers. Access to each floor is by inside stairs.

- Building 403 (Wet/Dry Chemical Pilot Plant) - This is a multiple story building which still contains its original equipment contents. Containerized wastes were found on all floors. Access to each floor is by inside stairs.

- Building 407 (Laboratory) - This is a single story building; however, some containerized wastes were located on the roof in service areas. The Subcontractor shall be responsible for the removal of all designated containerized wastes from inside the building and from the roof area(s). Also, the Subcontractor shall be responsible for removal of designated containerized wastes from eight sealed hoods inside the laboratory which contain fire extinguishers, cans, and bottles. No access problems are anticipated inside the building. Access to the roof is by outside stairs on the south side of the building.

- Building 408 (Maintenance and Stores) - This is a single story building which is generally open floor space. Most of the original shelving and cabinets remain in the building. In some rooms, access may be hindered by these structures.

- Building 409 (Administration Building) - This is a multiple story building which has had much of its original furniture contents removed. Access to each floor is by inside stairs.

- Building 410 (Services Building) - This is a single story building which is generally open floor space. Most of the original cabinets and shelving remain in the clinic and laboratory areas. Access in these rooms may be hindered by these structures.

- Building 417 (Paint and Oil Storage) - This is a single story building which contains a separate shop area, a paint booth, and benches and cabinets used for paint and materials storage. Access to some areas within a room may be hindered by these structures. Outside the building, the open land to the east and south contain abandoned vehicles, machinery, and equipment.

- Building 428 (Propane and Butane Tanks) - This is a single story building which still contains pumps and equipment used to transfer propane. Two large propane/butane tanks are located immediately adjacent to this building. Access to these tanks are through a fence and up outside stairs.

- Building 433 (Riggers' Storage) - This is a single story building which is divided into several rooms. Many of the rooms are filled with equipment, machinery, and vehicles. Access may be hindered by this equipment and machinery.

- Building 435 (Storage Building) - This is a single story building which is divided into several rooms. Some of the rooms are filled with office supplies, equipment, and machinery which may hinder containerized waste access inside the building. Outside the building to the southwest, there is equipment and machinery which may restrict access to some of the rooms. The Subcontractor may need to relocate some of this material to facilitate containerized waste removal.

- Building 436 (Storage Building) - This is a single story building which is divided into several rooms. All of the rooms are filled with cabinets, shelves, equipment and machinery which may hinder direct access to containerized wastes. Outside the building to the southeast and southwest there is equipment and machinery which may restrict access to some of the rooms, and to containerized waste located proximate to this building. The Subcontractor may need to relocate some of this material/equipment to facilitate containerized waste removal, both inside and outside the building.

- Building 438 (Storage Building) - This is a single story building which is 2/3 full of equipment, machinery, and supplies. The Subcontractor may need to relocate some of this material to facilitate containerized waste removal.

3.5 Stabilization of Wastes

Prior to transport, and as necessary to meet the requirements and make them acceptable for offsite transport and disposal, the Subcontractor shall perform onsite waste pretreatment, including but not limited to:

- Acid-Base Neutralization
- Metals Precipitation
- Oxidation of Cyanide and Sulfide
- Flash Point Reduction, and
- Solidification

3.6 Containerized Waste Handling Report

After the Subcontractor completes the activities for the Scope of Work, Subsection 2.1, the Subcontractor shall provide to the Contractor Representative(s) with a written report as to the status of the containerized waste handling activities. This report shall include, but will not necessarily be limited to the following:

- Quantity and Disposition of Wastes Handled
- Results of Laboratory Analyses and Compatibility Testing
- Volumes of Compatible Waste Classes
- Proposed Transportation Options and Requirements
- Proposed Disposal Options and Requirements

The Subcontractor shall provide these reports within five working days after completion of the Scope of Work, Subsection 2.1 activities.

3.7 Offsite Removal and Transport

After the Subcontractor has completed the activities identified in the Scope of Work, Subsection 2.1, the Subcontractor shall perform Subsection 2.2 activities.

The Subcontractor shall insure that all vehicles used for offsite transport of hazardous wastes are Department of Transportation approved and meet the specifications and requirements for the waste type being hauled.

The Subcontractor shall submit to the Contractor Representative(s) the EPA transporter number for each waste hauler, and the waste manifest records for each load, prior to the waste leaving the WSCP.

3.8 Notification of Disposal

The Subcontractor shall insure that all WSCP hazardous wastes are treated and/or disposed of using the most technically appropriate and regulatory acceptable disposal method(s). All organic liquids will be disposed of by incineration. The Subcontractor shall be responsible for and shall provide the Contractor with disposal documentation for each waste disposal facility utilized for WSCP containerized wastes.

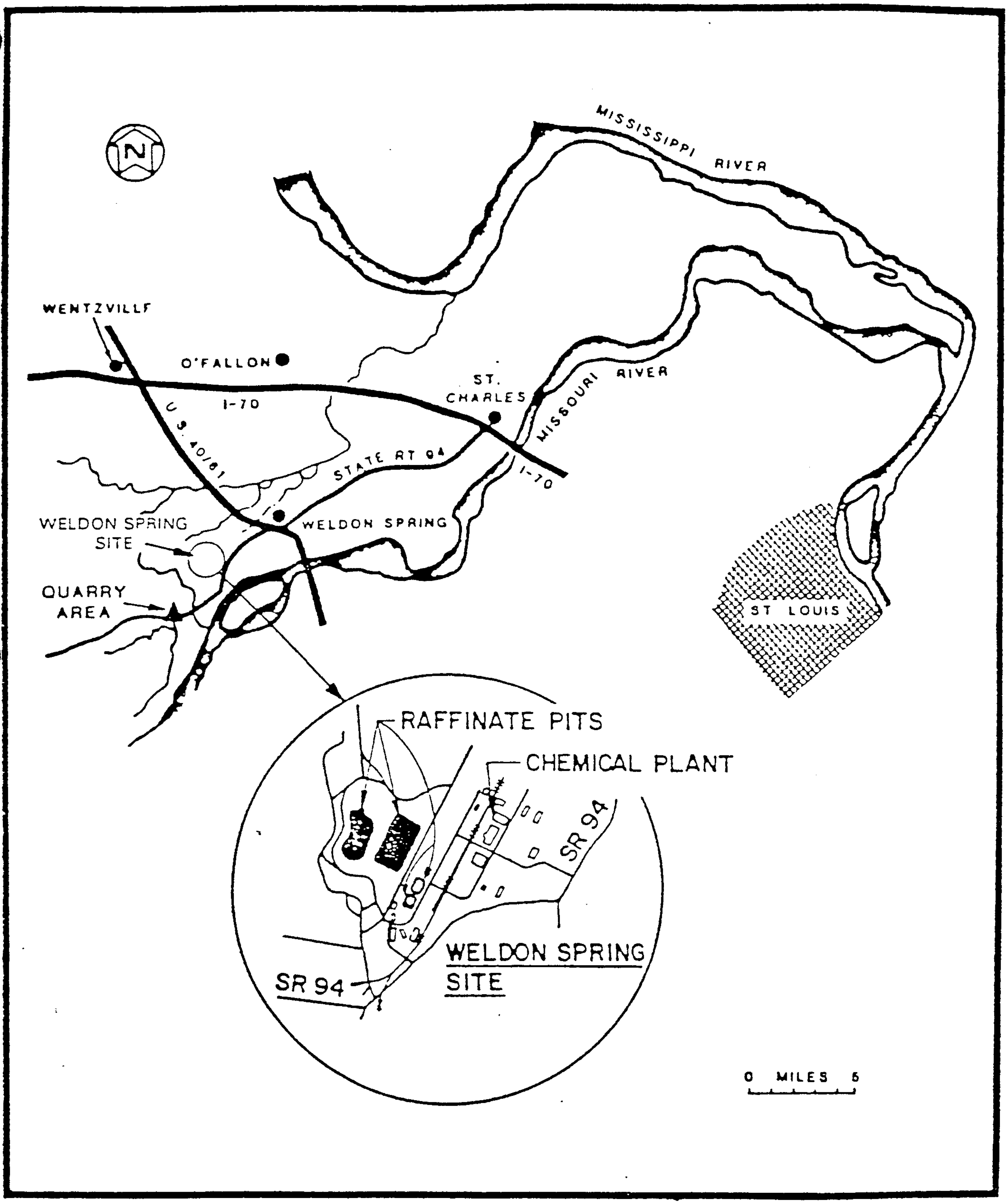
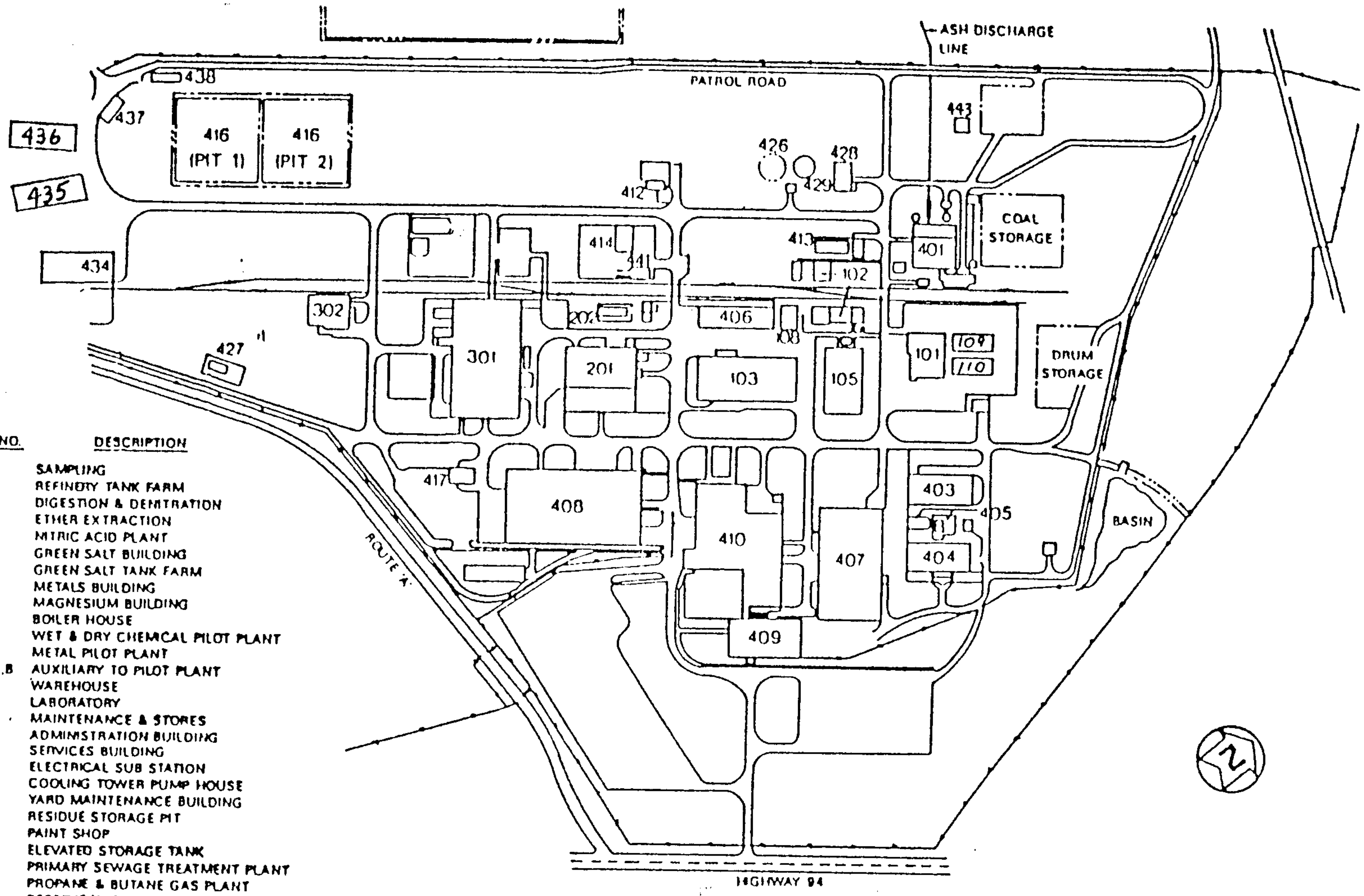


FIGURE 1-1 LOCATION OF WELDON SPRING CHEMICAL PLANT



AREA NO.	DESCRIPTION
101	SAMPLING
102	REFINERY TANK FARM
103	DIGESTION & DENITRATION
105	ETHER EXTRACTION
108	NITRIC ACID PLANT
201	GREEN SALT BUILDING
202	GREEN SALT TANK FARM
301	METALS BUILDING
302	MAGNESIUM BUILDING
401	BOILER HOUSE
403	WET & DRY CHEMICAL PILOT PLANT
404	METAL PILOT PLANT
405 A,B	AUXILIARY TO PILOT PLANT
406	WAREHOUSE
407	LABORATORY
408	MAINTENANCE & STORES
409	ADMINISTRATION BUILDING
410	SERVICES BUILDING
412	ELECTRICAL SUB STATION
413	COOLING TOWER PUMP HOUSE
414	YARD MAINTENANCE BUILDING
416	RESIDUE STORAGE PIT
417	PAINT SHOP
426	ELEVATED STORAGE TANK
427	PRIMARY SEWAGE TREATMENT PLANT
428	PROPANE & BUTANE GAS PLANT
429	RESERVE WATER FACILITIES
434	STORAGE BUILDING
437	STORAGE BUILDING
438	STORAGE BUILDING

FIGURE 1-2 MAJOR STRUCTURES AT WSCP SITE

DRAFT

FIGURE 3-1

Weldon Spring Site Remedial Action Project (WSSRAP)
Route 2, Highway 94 South, St. Charles, Missouri 63303
Phone (314) 441-8086 Telecopy (314) 447-0803

CONTAINERIZED CHEMICAL CONTENTS IDENTIFICATION

Container Number CC-2 -0587

Radioactivity Level

Alpha	______	Uranium-Natural	______
Beta	______	Uranium-238	______
Gamma	______	Thorium-230	______
		Radium-226	______
		Others ______	______
		______	______

Radiologically Releasable Off-Site: Yes or No

COMPATABILITY DATA

pH	______	
Peroxide or Oxidizer	Yes or No	
Reducing Agent	Yes or No	
Water-Reactive	Yes or No	
Halogen Content	Low or High	
Acid	Strong, Weak, or No	
Base	Strong, Weak, or No	
Cyanides	Yes or No	
Sulfides	Yes or No	
Flammability	______	
Specific Gravity	______	
Heat Content	______	BTU/lb
Solids Content	______	percent
Hydrocarbon	Yes or No	
Pesticides	Yes or No	
Sulfur Content	Low or High	
Phenols	Yes or No	
Oil and Grease	______	percent
Water	______	percent
Viscosity	______	
Organochlorine Content	______	percent
EP Toxicity Metals	Yes or No	
Solubility	H_2O H_2SO_4 or $(CH_3)_2SO$	

HAZARDOUS MATERIAL: Yes or No

Comments:

Lab Reports Transcribed By: (signature) ______

Date: ______

Form CC-3
MK-Ferguson Company -- Project Management Contractor

ATTACHMENT 1

Appendix I
Key

Functional Group Key

TRS	Trash
SOL	Fuel or Solvent
MT	Empty
GAS	Gas
BAT	Battery
TAR	Asphalt or Tar
UK	Unknown
PNT	Paint
lub	Oil or Lubricant
MG	Magnesium Metal
BAS	Alkaline Material
ACD	Acidic Material
MED	Medical Supplies
Che	Chemical/Laboratory reagents
H2O	Water
DRT	Soil or Dirt
Mix	Mixed Groups

Room Key

SW	Southwest
W/O	West Outside
N/O	North Outside
E/O	East Outside
S/O	South Outside
WST	West
W/R	West Roof
E/R	East Roof
EAS	East

APPENDIX I
Weldon Spring Site Remedial Action Project
Chemical Plant Containerized Chemical Inventory
May 1987

CONTAINER I.D. #	BUILDING #	ROOM #	CONTAINER TYPE	NUMBER	VOLUME EST. (ft3 OR GAL.)	FUNCTIONAL GROUP	PHASE	COLOR	INTEGRITY	PID READINGS	COMMENTS
CC-2216-0587	101	6A	1 Gallon Can	9	5.00	Solvent	Liquid		Good	0	9 1-GALLON UNLABELED, UNKNOWN TOP OF ELEVATOR, LOOK LIKE SOLVENT OR GREASE CONTAINERS. SOME APPEAR TO BE EMPTY.
CC-2217-0587	101	SW	Drum: Open Top	1	0.00	Trash	Solid			0	EMPTY EXCEPT FOR SOME MISC TRASH.
CC-2222-0587	103	B	Drum: Bung Top	1	55.00	Solvent	Liquid		Fair	0	55-GALLON DRUM OF "NO. 130 CLEAR WAX BASE", RUSTED TOP.
CC-2219-0587	106	A	Tank	1	0.00	Empty				0	REMAINING VOLUME IS UNKNOWN. EMPTY FLASH MIXER. 4'H X 3'D.
CC-2219-0587	106	A	Bottle	25	0.00	Empty			Good	0	EMPTY 8-OUNCE GLASS CONTAINERS.
CC-2184-0587	109	A	Gas Cylinder	12	0.00	Gas	Gas		Fair	0	"NITROGEN", 4'H CALIBRATION GASES 0.3% HEXANE IN NITROGEN.
CC-2184-0587	109	A	Gas Cylinder	1	0.00	Gas	Gas		Fair	0	UNLABELED. 3'H. CONTENTS UNKNOWN.
CC-2184-0587	109	A	Gas Cylinder	5	0.00	Gas	Gas		Fair	0	"OXYGEN". 2'H.
CC-2184-0587	109	A	Gas Cylinder	1	0.00	Gas	Gas		Fair	0	"CARBON TETRACHLORIDE". 4'H.
CC-2184-0587	109	A	Gas Cylinder	2	0.00	Gas	Gas		Fair	0	2 1 1/2-OUNCE "NATURAL GAS".
CC-2185-0587	110		Other	12	0.00	Battery	Solid		Fair	0	BATTERIES IN ELECTRIC CARTS, 6 EACH.
CC-2286-0587	201	103	1 Gallon Can	3	0.00	Empty			Fair	0	3 EMPTY 1-GALLON CANS OF ROOF TAR.
CC-2286-0587	201	103	1 Gallon Can	1	1.00	Solvent	Liquid		Fair	0	1-GALLON OF SOLVENT.
CC-2286-0587	201	103	5 Gallon Can	1	5.00	Tar	Liquid		Fair	0	ROOFING TAR.

APPENDIX I
Weldon Spring Site Remedial Action Project
Chemical Plant Containerized Chemical Inventory
May 1987

CONTAINER I.D. #	BUILDING #	ROOM #	CONTAINER TYPE	NUMBER	VOLUME EST. (ft3 OR GAL.)	FUNCTIONAL GROUP	PHASE	COLOR	INTEGRITY	PID READINGS	COMMENTS
CC-2288-0587	201	1ST	Drum: Bung Top	3	0.00	Empty			Fair	0	EMPTY 55-GALLON.
CC-2288-0587	201	1ST	Jar	1	1.00	Unknown	Liquid	Clear	Good	0	AMBER GALLON JAR FILLED WITH CLEAR LIQUID.
CC-2288-0587	201	1ST	Jar	1	0.50	Unknown	Liquid	Pink	Good	0	1-GALLON JAR CONTAINING PINK LIQUID.
CC-2288-0587	201	1ST	Drum: Open Top	1	40.00	Unknown	Liquid		Fair	0	40-GALLON DRUM, FULL.
CC-2285-0587	201A	W/O	Tank	1	0.00	Empty			Fair	0	LABELED "NITROGEN". ACCESS PORT OPEN TANK IS EMPTY. 6'D X 15'H.
CC-2224-0587	202		Tank	8	0.00				Good	0	16,000 GALLON, 40'H X 9'D. 3 OUTSIDE TANKS CHECKED AND EMPTY. 5 INSIDE TANKS LABELED HF AND BELIEVED TO BE EMPTY.
CC-2287-0587	301	102	Drum: Bung Top	22	165.00	Water			Good	0	19 EMPTY 55-GALLON DRUM OF "A & B ISONATE SYSTEM". 3 DRUMS CONTAIN RAINWATER FROM LEAKING ROOF.
CC-2287-0587	301	102	Other	1	4.00	Unknown	Solid		Fair	0	30-GALLON TRASH CAN.
CC-2292-0587	301	A	5 Gallon Can	1	0.00	Empty			Fair	0	EMPTY, "PROTECTIVE COATING".
CC-2292-0587	301	A	1 Gallon Can	1	0.00	Empty			Fair	0	EMPTY, "HEXANE".
CC-2292-0587	301	A	Bottle	1	10.00	Unknown	Liquid		Fair	0	10 GAL. PLASTIC BOTTLE POSSIBLY EMPTY.
CC-2293-0587	301	A	Drum: Open Top	1	7.35	Unknown			Good	0	IN COCOON #4.
CC-2294-0587	301	A	Drum: Open Top	2	7.35	Trash	Solid		Good	0	IN COCOON #11, FULL OF TRASH. RADIOLOGICALLY CONTAMINATED.
CC-2294-0587	301	A	5 Gallon Can	1	0.00	Empty			Fair	0	

APPENDIX I
Weldon Spring Site Remedial Action Project
Chemical Plant Containerized Chemical Inventory
May 1987

CONTAINER I.D. #	BUILDING #	ROOM #	CONTAINER TYPE	NUMBER	VOLUME EST. (ft3 OR GAL.)	FUNCTIONAL GROUP	PHASE	COLOR	INTEGRITY	PID READINGS	COMMENTS
CC-2295-0587	301	A	Drum: Open Top	25	1375.00	Unknown				0	55-GALLON DRUMS IN COCOON #13. SOME RADIOLOGICALLY CONTAMINATED. ASSUME LIQUID CONTENTS.
CC-2289-0587	301	C	1 Gallon Can	1	0.50	Paint	Liquid		Fair	0	YELLOW PAINT.
CC-2289-0587	301	C	1 Gallon Can	1	0.50	Lubricant	Liquid		Fair	0	1/2-GALLON OF TEXACO THERMATEX, EP-1.
CC-2289-0587	301	C	High Pressure	1	0.01	Gas	Gas		Fair	0	8-03. OUNCES OF "INSTANT START".
CC-2290-0587	301	D	Drum: Open Top	1	0.00	Empty			Fair	0	EMPTY 55-GALLON DRUM
CC-2290-0587	301	D	Drum: Open Top	1	30.00	Tar	Liquid		Fair	0	30 GAL. "TASIL 104W PATCH".
CC-2290-0587	301	D	5 Gallon Can	3	0.00	Empty			Fair	0	
CC-2291-0587	301	D	Drum: Open Top	3	110.00	Unknown			Fair	0	55-GALLON DRUMS, 1 EMPTY, 2 UNKNOWN. ASSUME LIQUID CONTENTS.
CC-2296-0587	301	N/O	Drum: Open Top	1	0.00	Empty			Fair	0	55-GALLON, OVERTURNED.
CC-2296-0587	301	N/O	Tank	1	0.00	Empty			Fair	0	EMPTY, 3'D X 6'H.
CC-2297-0587	301	N/O	Drum: Open Top	2	0.00	Empty			Poor	0	
CC-2297-0587	301	N/O	5 Gallon Can	1	5.00	Tar	Liquid		Fair	0	"ROOFING TAR".
CC-2297-0587	301	N/O	High Pressure	1	0.01	Gas	Gas		Fair	0	8 OZ. CAN, "INSTANT START."
CC-2158-0587	302	B	Drum: Open Top	7	51.40	Magnesium	Solid		Fair	0	55-GALLON LABELED "MG".
CC-2158-0587	302	B	Drum: Open Top	1	4.00	Magnesium	Solid		Fair	0	30-GALLON LABELED "MG".
CC-2159-0587	302	B	Drum: Open Top	6	22.00	Unknown	Solid		Fair	0	55-GALLON, RUSTED, SOME EMPTY. MAY CONTAIN MAGNESIUM SHAVINGS.

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CC-2159-0587	302	B	Drum: Open Top	16	64.00	Unknown	Solid		Fair	0	30-GALLON, RUSTED, SOME EMPTY. MAY CONTAIN MAGNESIUM SHAVINGS.
CC-2161-0587	302	B	Hopper	3	0.00	Unknown	Solid		Good	0	3 STEEL HOPPERS. 15'H X 8'D.
CC-2162-0587	302	C	Drum: Bung Top	1	0.00	Unknown	Liquid		Fair	0	40-GALLON, EMPTY
CC-2162-0587	302	C	1 Gallon Can	1	1.00	Solvent	Liquid		Fair	0	"ALL SURFACE CLEANER".
CC-2157-0587	302	E/O	Drum: Open Top	1	0.00	Empty			Fair	0	EMPTY.
CC-2157-0587	302	E/O	Drum: Open Top	1	7.35	Empty	Solid	White	Fair	0	55-GALLON CONTAINING WHITE POWDER.
CC-2157-0587	302	E/O	Drum: Open Top	1	7.35	Trash	Solid		Fair	0	55-GALLON DRUM FILLED WITH EMPTY PLASTIC CONTAINERS AND TRASH.
CC-2194-0587	401	1ST	Drum: Bung Top	1	55.00	Lubricant	Liquid	Amber	Poor	900	CAP LABELED "METAL LUBRICANTS CO.", FULL AND RUSTED. FULL, NEVER OPENED. FLASHPOINT = 35C.
CC-2195-0587	401	1ST	Other	72	20.00	Battery	Solid		Good	0	58 INDUSTRIAL TYPE BATTERIES ON EAST WALL, 14 ON NORTH WALL.
CC-2196-0587	401	1ST	Tank	1	0.00	Empty				0	EMPTY 3'D X 8'H TANK 10' ABOVE GROUND.
CC-2197-0587	401	1ST	Tank	1	10.00	Unknown	Liquid		Good	0	STEEL TANK ABOVE GROUND, 1.5'D X 3'H.
CC-2198-0587	401	1ST		1	0.40	Unknown	Solid		Poor	0	HALF FULL 80-POUND BAG OF UNKNOWN MATERIAL.
CC-2199-0587	401	1ST	Tank	2	0.00	Unknown	Liquid		Fair	0	2 1.5'D X 7.5'H TANKS IN PARALLEL. PROBABLY EMPTY.
CC-2200-0587	401	1ST	Tank	1	0.00	Unknown	Liquid			0	80-GALLON TANK ON CART, PROBABLY EMPTY.

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CC-2201-0587	401	1ST	Tank	1	0.00	Unknown	Liquid		Fair	0	3'D X 7'H TANK, PROBABLY EMPTY.
CC-2201-0587	401	1ST	Tank	2	0.00	Unknown	Liquid		Good	0	2 1.5'D X 6'H TANKS, PROBABLY EMPTY.
CC-2202-0587	401	1ST	Tank	6	0.00	Unknown	Liquid			0	6 5'D X 6'H TANKS LABELED "HYDROGEN SOFTENER". PROBABLY EMPTY.
CC-2203-0587	401	1ST	Tank	1	0.00	Unknown	Liquid			0	8'D X 15'H TANK LABELED "DEGASIFIER", PROBABLY EMPTY.
CC-2204-0587	401	1ST	Drum: Bung Top	2	110.00	Unknown	Liquid	Amber	Poor	500	(2204A & AA) 2 55-GALLON DRUMS, RUSTED. ONE OPENED, ONE SEALED. DRUM SAMPLE HAD TWO PHASES, AMBER AND BLACK SLUDGE. FLASHPOINT (2204A) = 63C, FLASHPOINT (2204AA) = 32C.
CC-2204-0587	401	1ST	5 Gallon Can	2	10.00	Lubricant	Liquid			0	2 5-GALLON CONTAINERS LABELED "B & B GREASE".
CC-2204-0587	401	1ST	Jar	1	1.50		Solid			0	1 10-GALLON CONTAINERS LABELED BONDING MORTAR.
CC-2204-0587	401	1ST		1	0.50	Unknown	Solid		Poor	0	OPEN AND SPILLED BAG.
CC-2205-0587	401	1ST	Tank	1	0.00	Unknown	Liquid		Fair	0	4'H X 3'D TANK OF UNKNOWN, PROBABLY EMPTY.
CC-2206-0587	401	1ST	Tank	1	0.00	Unknown	Liquid		Fair	0	2'D X 7'H TANK OF UNKNOWN, PROBABLY EMPTY.
CC-2207-0587	401	1ST		1	1.00		Solid		Poor	0	2 80-POUND BAGS, OPEN, HALF FULL, APPEARING TO BE SALT.
CC-2208-0587	401	1ST	Tank	1	0.00	Empty				0	1'D X 4'H EMPTY TANK.
CC-2209-0587	401	1ST	Tank	1	0.00	Empty			Fair	0	3'D X 4'H STAINLESS STEEL TANK, EMPTY.

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CC-2212-0587	401	S/O	Drum: Bung Top	2	0.00	Empty			Poor	0	2 EMPTY AND RUSTED 55-GALLON DRUMS.
CC-2002-0587	403	A	Box	1	0.25		Solid	White	Fair	0	10-POUNDS OF POWDER.
CC-2300-0587	403	A	Jar	1	0.10	Lubricant	Liquid			0	1-PINT OF RED-ORANGE OIL.
CC-2300-0587	403	A	Can	2	0.50	Unknown	Liquid			0	2 1-QUART METAL CONTAINERS.
CC-2301-0587	403	A	5 Gallon Can	1	0.00	Empty				0	
CC-2301-0587	403	C	Bottle	2	2.00	Acid	Liquid		Good	0	2 1-GALLON BOTTLES OF NITRIC ACID.
CC-2301-0587	403	C	Jar	3	0.25	Unknown				0	2 1-PINT JARS OF UNKNOWN LIQUID, 1 EMPTY CONTAINER.
CC-2302-0587	403	D	High Pressure	1	0.00	Water	Liquid			0	500 GALLON WATER TANK, PROBABLY EMPTY.
CC-2304-0587	403	E	1 Gallon Can	1	1.00	Lubricant	Liquid		Fair	0	1 GALLON OF OIL.
CC-2304-0587	403	E	Drum: Open Top	8	58.80	Unknown	Solid	White		0	DRUMS LABELED FILTER AID. FINE POWDER. FLASHPOINT > 110C.
CC-2305-0587	403	E	Drum: Open Top	12	66.00	Chemicals	Solid	White	Fair	0	(2305A) 3 EMPTY 55-GALLON DRUMS. DRUMS ON WEST WALL LABELED SODIUM SULFITE (6 DRUMS). HEAVY FINE POWDER. 3 UNKNOWNS. FLASHPOINT > 110C.
CC-2305-0587	403	E	Fiberboard	1	2.00	Unknown	Solid	Pink	Poor	0	(2305B) DRUM SAMPLED WAS 1/2 FULL AND COLLAPSED. FLASHPOINT > 110C.
CC-2306-0587	403	E		10	10.00	Chemicals	Solid		Poor	0	BICARBONATE OF SODA.
CC-2306-0587	403	E		14	14.00		Solid		Poor	0	14 BAGS OF SILICA.
CC-2298-0587	403	N/O	Tank	1	0.00	Empty				0	EMPTY 6'D X 18'H TANK LABELED "KOH CAUSTIC POTASH."

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CC-2235-0587	404	2ND	Other	1	0.00	Unknown	Liquid			0	BLENDER TANK. PROBABLY EMPTY.
CC-2225-0587	404	A	5 Gallon Can	2	5.00	Unknown	Liquid		Fair	0	
CC-2225-0587	404	A	5 Gallon Can	1	5.00	Solvent	Liquid			0	5-GALLON FUEL CONTAINER.
CC-2225-0587	404	A	Jar	1	0.04	Unknown	Solid	White	Fair	0	1 16-OZ JAR OF WHITE MATERIAL.
CC-2225-0587	404	A	1 Gallon Can	1	1.00	Unknown			Poor	0	1-GALLON RUSTED CAN.
CC-2225-0587	404	A		2	2.00		Solid		Poor	0	2 80-POUND BAGS OF "DIATOMITE".
CC-2229-0587	404	A	Tank	1	25.00	Lubricant	Liquid			0	OIL TANK, 1'D X 4'H.
CC-2231-0587	404	A	Fiberboard	6	24.00		Solid		Poor	0	6 300-POUND FIBERBOARD CONTAINERS OF LITHIUM CHLORIDE.
CC-2231-0587	404	A	Fiberboard	10	40.00		Solid		Poor	0	10 400-POUND FIBERBOARD CONTAINERS OF BARIUM FLUORIDE.
CC-2231-0587	404	A	Fiberboard	3	4.00		Solid		Poor	0	3 100-POUND FIBERBOARD CONTAINERS OF CEMENT.
CC-2231-0587	404	A	1 Gallon Can	2	2.00	Unknown	Liquid		Fair	0	2 1-GALLON CANS, UNKNOWN.
CC-2231-0587	404	A	Jar	1	0.27		Solid		Fair	0	1 2-GALLON CAN OF CARBON GRAPHITE.
CC-2231-0587	404	A	Bottle	2	0.25	Unknown	Liquid			0	MISC. BOTTLES OF UNKNOWN.
CC-2232-0587	404	A	Fiberboard	1	4.00		Solid		Fair	0	1 400-POUND FIBERBOARD DRUM OF BARIUM FLUORIDE.
CC-2232-0587	404	A	Fiberboard	1	4.00		Solid		Fair	0	1 300-POUND FIBERBOARD DRUM OF LITHIUM CHLORIDE.

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CC-2232-0587	404	A	Tank	1	0.00	Gas	Gas			0	HYDRAULIC AIR TANK.
CC-2234-0587	404	A	Other	1	0.00	Unknown	Liquid		Fair	0	REACTION VESSEL, 6'H X 5'D. PROBABLY EMPTY.
CC-2236-0587	404	A	Other	1	0.00	Water	Liquid		Fair	0	HEATER TANK, 1.5'D X 4'H. PROBABLY EMPTY.
CC-2237-0587	404	A	Drum: Bung Top	1	55.00	Lubricant	Liquid	Yellow	Good	0	UNKNOWN, BLUE 55-GALLON DRUM, PCB CONTAMINATED @ 3 PPM. FLASHPOINT < 0C.
CC-2227-0587	404	B	Hopper	1	0.00	Unknown	Solid		Poor	0	RUSTED HOPPER.
CC-2228-0587	404	C	Hopper	0	0.00	Unknown	Solid			0	SMALL STAINLESS STEEL HOPPER.
CC-2230-0587	404	D	Jar	10	10.00	Mixture	Liquid			0	10 MISC. JARS AND CANS (HYDRAULIC FLUID, UNKNOWNS, CUTTING FLUID, CLEANERS, SAMPLE MATERIAL, OIL, ETC.)
CC-2233-0587	404	E	Other	2	5.00	Base	Solid	White	Fair	0	2 GARBAGE CANS LABELED SODA ASH.
CC-2233-0587	404	E	Other	2	2.00		Solid		Fair	0	2 10-GALLON BUCKETS LABELED "NAK SPILLAGE ONLY".
CC-2233-0587	404	E	Other	1	1.00	Unknown	Liquid	Black	Fair	0	1 GAL BUCKET OF BLACK UNKNOWN LIQUID.
CC-2239-0587	404	E/O	Drum: Open Top	1	3.00	Unknown	Solid		Good	0	OPEN 55-GALLON DRUM, HALF FULL OF BROWN MATERIAL.
CC-2018-0587	404	N/O	Drum: Open Top	1	0.00	Empty			Poor	0	EMPTY, RUSTED 55-GALLON DRUM.
CC-2238-0587	404	WST	Tank	1	0.00	Unknown	Liquid		Fair	0	BLUE TANK, 3'D X 9'H. PROBABLY EMPTY.
CC-2238-0587	404	WST	Tank	1	0.00	Empty			Good	0	OPEN, EMPTY, GRAY TANK.

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CC-2240-0587	405	N/O	Drum: Open Top	1	0.00	Empty			Good	0	EMPTY RADIOACTIVE 55-GALLON DRUM. 150 K CPM BETA. GAMMA.
CC-2176-0587	406	A	5 Gallon Can	1	5.00	Tar	Liquid		Fair	0	1 5-GALLON CAN OF POLYCLAD.
CC-2176-0587	406	A		9	9.00	Base	Solid		Fair	0	9 BAGS OF TYPE "S" LIME.
CC-2176-0587	406	A	Bottle	1	1.00	Solvent	Liquid		Good	0	1-GALLON BOTTLE OF "ALCOHOL".
CC-2178-0587	406	B	Drum: Open Top	2	14.70	Trash	Solid		Good	0	55-GALLON DRUMS FILLED WITH SAMPLE MATERIAL OR TRASH.
CC-2179-0587	406	B	5 Gallon Can	4	10.00	Tar	Liquid		Fair	0	FLINTKOTE "LEVEL-KOTE".
CC-2303-0587	407	65	5 Gallon Can	1	0.27	Unknown	Liquid	Yellow	Good	3	2-GALLONS OF OPAQUE YELLOW FLUID IN A 5-GALLON STEEL OVERPACK. TAKEN FROM HOOD #8. RADIOACTIVELY CONTAMINATED.
CC-2280-0587	407	68	Gas Cylinder	2	0.00	Gas	Gas		Fair	0	2 LECTURE SIZE GAS CYLINDERS.
CC-2284-0587	407	S/O	Other	5	0.00	Empty				0	8 5-GALLON EMPTY BUCKETS.
CC-2284-0587	407	S/O	Bottle	37	37.00	Acid	Liquid		Good	0	37 1-GALLON BOTTLES OF 70% NITRIC ACID.
CC-2284-0587	407	S/O	Bag	3	3.00	Unknown	Solid	White	Poor	0	3 SPILLED 100-POUND BAGS OF UNKNOWN MATERIAL.
CC-2279-0587	407A	61	Gas Cylinder	2	0.00	Gas	Gas			0	2 GAS CYLINDERS, PROBABLY EMPTY.
CC-2279-0587	407A	61	Box	7	0.00	Battery	Solid		Fair	0	7 BOXES (12 EACH) OF "C" BATTERIES.
CC-2279-0587	407A	61	Bottle	6	0.00	Unknown			Fair	0	6 MISC GLASS BOTTLES, PROBABLY EMPTY.
CC-2280-0587	407A	68	Jar	1	0.10	Lubricant	Liquid		Good	0	EYER-DROPPER OF RED, OILY LIQUID.

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CC-2276-0587	407A	E/R	5 Gallon Can	2	5.00	Unknown	Liquid			0	ONE EMPTY, ONE FULL OF UNKNOWN MATERIAL.
CC-2276-0587	407A	E/R	1 Gallon Can	1	1.00	Solvent	Liquid		Fair	0	1-GALLON FUEL CAN.
CC-2276-0587	407A	E/R	1 Gallon Can	1	1.00	Lubricant	Liquid	White	Fair	0	1-GALLON OF WHITE OIL.
CC-2276-0587	407A	E/R	Tank	2	0.00	Empty			Fair	0	EMPTY ALUMINUM TANKS OF DISTILLED WATER, 1400 GALLONS EACH.
CC-2277-0587	407A	E/R	5 Gallon Can	1	5.00	Tar	Liquid		Fair	0	ASPHALT COATING.
CC-2277-0587	407A	E/R	Other	6	4.00	Solvent	Liquid		Fair	0	MISC.: 2 1-PINT CANS OF CEMENT AND GREASE, 1-GAL OF THINNER, 1-GAL OF BITUMINOUS PAINT, BOX OF CHEM-E-PUCK ASBESTOS PACKNG, AND 1-GAL OF THINNER.
CC-2278-0587	407A	E/R	Tank	1	0.00	Gas			Fair	0	COMPRESSOR TANK, 3.5'D X 5'H
CC-2278-0587	407A	E/R	Tank	1	30.00		Liquid		Fair	0	SQUARE TANK, 2' X 3' X 9".
CC-2275-0587	407A	W/R	Drum: Open Top	1	7.35	Trash	Solid		Fair	0	55-GALLON DRUM CONTAINING LIGHT BULBS.
CC-2275-0587	407A	W/R	5 Gallon Can	1	0.00	Empty			Fair	0	EMPTY FIVE GALLON CAN.
CC-2275-0587	407A	W/R	1 Gallon Can	1	0.00	Empty			Fair	0	EMPTY ONE GALLON CAN.
CC-2280-0587	407B	68	1 Gallon Can	1	1.00	Unknown	Liquid		Fair	0	UNKNOWN CONTENTS.
CC-2282-0587	407D	17	Bottle	20	5.00	Acid	Liquid		Fair	0	20 1-QUART PLASTIC BOTTLES OF HYDROFLUORIC ACID.
CC-2282-0587	407D	17	Bottle	1	0.01	Unknown	Liquid		Fair	0	2-POUNDS OF "PEERAMID M-19".
CC-2282-0587	407D	17	5 Gallon Can	11	55.00	Mixture	Liquid		Fair	0	5-GALLON CONTAINERS: UNKNOWNS, METHLY ALCOHOL, MAGNESIUM OXIDE, ETC.

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CC-2282-0587	407D	17	Fiberboard	1	5.35		Solid		Fair	0	1-40-GALLON FIBERBOARD CONTAINER "LIQUID HEAT".
CC-2282-0587	407D	17	Fiberboard	1	4.00		Solid		Fair	0	100-POUND, 30-GALLON CONTAINER OF BARIUM FLUORIDE.
CC-2282-0587	407D	17	Drum: Open Top	1	7.35		Solid		Fair	0	55-GALLON DRUM OF CALCIUM METAL.
CC-2282-0587	407D	17	Fiberboard	2	9.36	Unknown	Solid		Fair	0	30-GALLON AND 40-GALLON CONTAINERS OF UNKNOWN MATERIAL.
CC-2282-0587	407D	17	Other	6	1.50	Chemicals	Liquid		Fair	0	5-QUART CONTAINER OF MERCURY, 3 FULL, 2 HALF FULL. 1-2OZ BOTTLE.
CC-2281-0587	407D	34	Tank	1	0.00	Water	Liquid		Fair	0	2'D X 6'H, POSSIBLY ASBESTOS LINED STEAM TANK. PROBABLY EMPTY.
CC-2281-0587	407D	34	Bag	4	4.00		Solid		Fair	0	4 100-POUND BAGS OF ACTIVATED CARBON.
CC-2281-0587	407D	34	Bottle	2	10.00	Solvent	Liquid		Good	0	1 PINT OF 3M ACTIVATOR FLUID, 1/2 PINT OF FINOL HOUSEHOLD OIL.
CC-2096-0587	408A	A	Gas Cylinder	1	0.10	Gas	Gas		Good	0	SMALL PROPANE GAS CYLINDER.
CC-2096-0587	408A	A	Other	36	15.00	Unknown	Liquid			0	CONTAINERS PARTIALLY FULL, UNKNOWN LIQUIDS, SOME SOLIDS.
CC-2097-0587	408A	A	Drum: Open Top	2	60.00	Lubricant	Liquid		Good	0	2-30 GAL. DRUMS LABELED LUBRIPLATE.
CC-2097-0587	408A	A	Fiberboard	1	4.00	Unknown	Solid	White		0	WHITE POWDER.
CC-2097-0587	408A	A	5 Gallon Can	1	5.00	Lubricant	Liquid			0	LABELED WESSON OIL.
CC-2097-0587	408A	A	5 Gallon Can	1	0.67	Tar	Solid		Poor	0	LABELED CEMENT ADHESIVE.

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CC-2098-0587	408A	A	Drum: Open Top	1	0.00	Empty				0	55 GAL DRUM IS EMPTY LABELED "KEROAINE".
CC-2099-0587	408A	A	Bottle	1	0.25		Liquid		Good	0	QUART JAR LABELED "ISOTOX."
CC-2307-0587	408A	A	Other	3	25.00		Liquid	Black	Fair	0	OIL BATHS. RADIOLOGICALLY CONTAMINATED. FLASHPOINT > 110C.
CC-2099-0587	408A	B	Jar	1	0.25	Lubricant	Liquid		Good	0	1 QT. GLASS JAR LABELED "MOTOR OIL."
CC-2100-0587	408A	B	Fiberboard	4	5.35	Tar	Solid	Black	Poor	0	10 GALLON CONTAINERS ARE COLLAPSED AND SPILLING. CONTAIN ASPHALT.
CC-2100-0587	408A	B	5 Gallon Can	2	10.00	Tar	Solid	Black	Poor	0	LABELED "LEVEL-KOTE".
CC-2106-0587	408A	B	Other	4	1.00	Mixture	Liquid			0	MISC. INCLUDING PROPANE, INK, HONING OIL AND "ROSINESBALINE".
CC-2106-0587	408A	B	Other	5	1.25	Mixture	Liquid			0	5 UNKNOWN 1 QUART BOTTLES
CC-2110-0587	408A	B	Other	4	2.00	Chemicals	Liquid		Good	0	WALL TILE, 1 GAL CAN & 1 QT BOTTLE ETHYLENE DICHLORIDE, 1 QT BOTTLE ETHYLENE CHLORIDE, AND SMALL CAN GLAZING COMPOUND.
CC-2110-0587	408A	B	High Pressure	1	0.00	Empty				0	SPRAY PAINT CAN.
CC-2121-0587	408A	B	Bag	2	1.00	Unknown	Solid			0	2-80 POUND BAGS.
CC-2121-0587	408A	B	Bottle	1	1.00	Solvent	Liquid	Yellow	Good	0	ANTI-RADIOACTIVE CLEANER.
CC-2121-0587	408A	B	Bottle	1	1.00					0	ANTI-FREEZE.
CC-2103-0587	408A	C	Other	8	5.00	Mixture	Liquid		Good	0	8 MISCELLANEOUS GLASS BOTTLES AND CANS LABELED "ELECTROPLATES", "SODIUM CYANIDE", "SUPER-SOLV", "WELDING FLUX" AND "DYKEM STEEL BLUE".

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CC-2104-0587	408A	C	Other	9	2.00	Mixture	Liquid		Good	0	MISCELLANEOUS JARS & BOTTLES INCLUDING ISOPROPYL, PROPANE, SILVER PLATING POWDER, LEAD SEAL AND CLEANING COMPOUNDS.
CC-2105-0587	408A	C	Drum: Open Top	1	30.00		Liquid		Good	0	ELECTROLYTE
CC-2101-0587	408A	D	5 Gallon Can	1	5.00	Solvent	Liquid			0	FUEL CAN. POSSIBLY EMPTY.
CC-2101-0587	408A	D	5 Gallon Can	2	10.00	Lubricant	Liquid			0	LABELED "B B".
CC-2101-0587	408A	D	Other	2	0.00	Empty				0	PLASTIC CONTAINERS
CC-2102-0587	408A	D	Drum: Bung Top	2	55.00	Base	Liquid		Good	0	DRUM WITH SPIGOT ON CART LABELED "LIQUID CAUSTIC POTASH".
CC-2102-0587	408A	D	5 Gallon Can	1	5.00	Solvent	Liquid			0	FUEL CAN
CC-2102-0587	408A	D	Drum: Bung Top	1	30.00		Liquid		Poor	0	30 GAL. DRUM LABELED "EXIDE NICKEL ALKALINE - BATTERY ELECTROLITE".
CC-2107-0587	408A	E	1 Gallon Can	1	1.00	Paint	Liquid			0	PAINT CAN.
CC-2107-0587	408A	E	Other	15	2.00	Mixture	Liquid			0	MISC. CANS AND JARS.
CC-2107-0587	408A	E	5 Gallon Can	1	0.00	Empty				0	
CC-2107-0587	408A	E	Bottle	1	0.00	Empty			Good	0	PLASTIC 1 GALLON BOTTLE.
CC-2108-0587	408A	E	5 Gallon Can	3	10.00	Solvent	Liquid			0	PROTECTIVE COATING/THINNER/CEMENT.
CC-2108-0587	408A	E	5 Gallon Can	1	5.00	Solvent	Liquid			0	5 GALLON SQUARE.
CC-2108-0587	408A	E	1 Gallon Can	7	7.00	Solvent	Liquid			0	PAINT CANS/THINNERS.

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CC-2108-0587	408A	E	Other	4	0.00	Base	Solid		Good	0	SALT TABLETS. 100 TABLETS TO BOX.
CC-2109-0587	408A	F	5 Gallon Can	4	5.00	Tar	Liquid			0	PROTECTIVE COATING.
CC-2109-0587	408A	F	Other	1	1.00	Solvent	Liquid			0	FUEL CAN
CC-2109-0587	408A	F	Other	1	0.02	Tar	Liquid			0	1/2 PINT OF ADHESIVE.
CC-2109-0587	408A	F	5 Gallon Can	1	5.00	Solvent	Liquid			0	POLYCLAD THINNER.
CC-2111-0587	408A	G	Other	1	5.35	Trash	Solid			0	TRASH.
CC-2111-0587	408A	G	Fiberboard	1	7.35	Unknown	Solid			0	FLOOR SWEEPING COMPOUND.
CC-2111-0587	408A	G	Drum: Open Top	1	7.35	Unknown	Solid	White		0	WHITE POWDER. FOUND TO BE CORROSIVE. FLASHPOINT OF 110C.
CC-2112-0587	408A	G	Other	7	2.00	Unknown	Liquid			0	MISC. CANS AND BOTTLES.
CC-2112-0587	408A	G	1 Gallon Can	1	1.00	Paint	Liquid			0	PAINT CANS.
CC-2112-0587	408A	G	5 Gallon Can	1	5.00	Solvent	Liquid			0	5 GAL FUEL CAN
CC-2113-0587	408A	G	Drum: Open Top	1	7.35	Trash	Solid			0	TRASH.
CC-2113-0587	408A	G	Drum: Bung Top	1	0.00	Empty				0	
CC-2114-0587	408A	H	Drum: Bung Top	1	55.00	Solvent	Liquid	Yellow	Good	40	(2114A) "SPECIAL SAFETY SOLVENT" NAVY BRAND PRODUCTS. FLASHPOINT < 0C.
CC-2114-0587	408A	H	Drum: Bung Top	1	55.00	Solvent	Liquid	Amber	Fair	80	(2114B) UNLABELED. FLASHPOINT = 78C.
CC-2115-0587	408A	H	5 Gallon Can	2	0.00	Empty				0	

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CC-2115-0587	408A	H	Other	4	0.10	Solvent	Liquid	White		0	4-8OZ JARS OF SUPER-SOLV.
CC-2115-0587	408A	H	Other	6	0.00	Empty			Good	0	MISC. CANS AND PLASTIC CONTAINERS.
CC-2145-0587	408A	W/O	Drum: Bung Top	1	55.00	Unknown	Liquid			0	
CC-2116-0587	408B	J	1 Gallon Can	1	1.00	Solvent	Liquid			0	FUEL CAN.
CC-2116-0587	408B	J	5 Gallon Can	1	5.00	Tar			Good	0	ACOUSTIC CEMENT.
CC-2116-0587	408B	J	5 Gallon Can	1	5.00	Lubricant	Liquid		Good	0	"MOBILE" OIL.
CC-2116-0587	408B	J	5 Gallon Can	1	5.00	Lubricant	Liquid		Good	0	"SUNISO".
CC-2116-0587	408B	J	Other	6	1.00	Solvent	Liquid		Good	0	MISC. 1 QT PLASTIC CONTAINERS.
CC-2117-0587	408B	J	Bag	6	3.00		Solid			0	DOWFLAKE 77-80% CALCIUM CHLORIDE.
CC-2118-0587	408B	J	Other	1	5.00	Lubricant	Liquid		Fair	0	5 GALLON OIL TANK (1D X 2H).
CC-2119-0587	408B	K	5 Gallon Can	2	5.00	Lubricant	Liquid			0	AMOLUBE.
CC-2119-0587	408B	K	5 Gallon Can	0	0.00	Empty				0	FUEL CONTAINER.
CC-2119-0587	408B	K	5 Gallon Can	1	5.00	Lubricant	Liquid			0	LUBRICANT
CC-2119-0587	408B	K	Other	2	0.00	Battery	Solid			0	2 AUTOMOBILE 12V BATTERIES.
CC-2119-0587	408B	K	Other	25	5.00	Solvent	Liquid			0	1 QUART CONTAINERS OF OIL, SOLVENTS, AND LUBRICANTS.
CC-2119-0587	408B	K	1 Gallon Can	1	0.13	Base	Liquid			0	ONOX SKIN TOUGHENER.
CC-2120-0587	408B	K	Drum: Bung Top	1	0.00	Empty				0	CENTURY SPRAY UNIT.

CONTAINER I.D. #	BUILDING #	ROOM #	CONTAINER TYPE	NUMBER	VOLUME EST. (ft3 OR GAL.)	FUNCTIONAL GROUP	PHASE	COLOR	INTEGRITY	PID READINGS	COMMENTS
CC-2120-0587	408B	K	Other	1	1.34	Chemicals	Solid			0	10-GAL CONTAINER "OLIN - HTH", CHLORINE.
CC-2146-0587	408B	W/O	Gas Cylinder	7	0.00	Gas	Gas			0	NITROGEN CYLINDERS, UN 1002, 4 1/2 FT. FOR ACTIVE USE.
CC-2147-0587	408B	W/O	5 Gallon Can	5	2.00	Solvent	Liquid			0	SOME RUSTED OIL AND WATER - "FOAM".
CC-2139-0587	408C	E/O	Drum: Bung Top	1	55.00	Unknown	Liquid	Brown	Good	54	ON CART WITH A SPIGOT. DRUM ON SIDE ON A RACK. FLASHPOINT (2139A) = 80C. FLASHPOINT (2139AA) = 74C.
CC-2133-0587	408C	P	5 Gallon Can	3	10.00	Solvent	Liquid			0	FUEL, SOLVENT CANS.
CC-2133-0587	408C	P	5 Gallon Can	1	5.00	Unknown	Liquid			0	LECITE BINDER.
CC-2133-0587	408C	P		5	1.00		Solid			0	6-POUND BAGS OF "ADHESO" DRY PASTE.
CC-2133-0587	408C	P	Other	4	0.10	Mixture	Liquid			0	INK, SPRAY CAN, ETC.
CC-2133-0587	408C	P	Other	4	10.00	Solvent	Liquid			0	4 5-GAL. SQUARE CONTAINERS.
CC-2133-0587	408C	P	1 Gallon Can	1	1.00	Unknown	Liquid			0	"SHERLOCK 5-SECOND LEAK DETECTOR."
CC-2133-0587	408C	P	1 Gallon Can	1	1.00	Unknown				0	UNKNOWN.
CC-2133-0587	408C	P	Other	2	0.25	Solvent	Liquid			0	2-8OZ SUPER-SOLV.
CC-2133-0587	408C	P	5 Gallon Can	1	5.00	Tar	Liquid			0	LIQUID ROOF.
CC-2133-0587	408C	P	Drum: Bung Top	1	7.35	Empty				0	
CC-2134-0587	408C	P		5	2.50		Solid			0	80 POUND BAGS OF CALGON GLASSY SODIUM PHOSPHATE.
CC-2135-0587	408C	P	Bag	1	0.50		Solid		Poor	0	100 POUND BAG OF CALCIUM CHLORIDE.

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CC-2135-0587	408C	P	Bag	2	1.00	Unknown	Solid		Poor	0	UNKNOWN 100 POUND BAGS.
CC-2136-0587	408C	P	5 Gallon Can	4	5.00	Tar	Liquid			0	CEMWAX THEMO CONDUCTING CEMENT BY CHEMAX.
CC-2136-0587	408C	P	5 Gallon Can	1	5.00	Lubricant	Liquid			0	NUCLEAR CUTTING OIL.
CC-2136-0587	408C	P	5 Gallon Can	1	2.00	Solvent	Liquid			0	STENCIL INK.
CC-2136-0587	408C	P	Fiberboard	2	0.00		Solid		Poor	0	CONTAINS BRICKS.
CC-2136-0587	408C	P	5 Gallon Can	1	0.67	Unknown	Solid			0	CUTTING AND SCARFING POWDER BY OXWELD.
CC-2136-0587	408C	P	Bag	2	0.50	Unknown	Solid	Brown		0	60 POUND GUNNY SACKS CONTAINING BROWN POWDER.
CC-2165-0587	408C	P	Other	25	10.00	Mixture	Liquid			0	MISC: 2-BATTERIES, 6-QTS OF SULFURIC ACID ELECTROLYTE, 5-GAL OF FUEL, 5 5-GAL OF OIL AND LUBRICANT, 2 1-GAL OF LUBRICANT,GAS TANKS FOR TRACTOR AND FORKLIFT, PORTABLE GREASER, AND 11 CANS AND JARS.
CC-2166-0587	408C	P	Drum: Bung Top	1	0.00	Empty				0	EMPTY 55-GALLON DRUM ON HOLDER.
CC-2167-0587	408C	P	Drum: Open Top	1	55.00	Solvent	Liquid		Fair	0	ANTIFREEZE.
CC-2167-0587	408C	P	Drum: Open Top	1	4.00	Lubricant	Liquid		Fair	0	30-GALLON DRUM OF MULTI-LUBE.
CC-2167-0587	408C	P	Drum: Open Top	1	0.53	Trash	Solid		Fair	0	40-GALLON DRUM OF RAGS.
CC-2168-0587	408C	P	Tank	1	0.00	Empty				0	EMPTY.
CC-2169-0587	408C	P	Drum: Bung Top	1	0.00	Empty			Poor	0	RUSTED, BULGING 55-GALLON DRUM.
CC-2169-0587	408C	P	Other	1	1.30	Empty				0	10-GALLON FUEL CONTAINER.

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CC-2170-0587	408C	P	Drum: Bung Top	1	0.00					0	EMPTY 80-GALLON OVERPACK DRUM ON CART.
CC-2137-0587	408C	Q	Bottle	1	5.00		Liquid			0	5 GAL OF INDUSTRIAL SOAP.
CC-2137-0587	408C	Q	Gas Cylinder	1	0.00	Gas	Gas			0	LECTURE PROPANE BOTTLE.
CC-2137-0587	408C	Q	Other	50	5.00	Mixture	Liquid			0	MISC. JARS: LIQUID SNAKE SINK CLEANERS, GLYCERIN, RED CAGE OIL, ADHESIVE, PIPE JOINT COMPOUND, ACETONE, CHLOROFORM, LEAD LUBRICANT SEAL, BUFFERS, ETC.
CC-2138-0587	408C	Q	Gas Cylinder	1	0.00	Gas	Gas			0	2'H PROPANE, CYLINDER.
CC-2138-0587	408C	Q	Gas Cylinder	3	0.00	Gas	Gas			0	2'H GAS CYLINDERS.
CC-2140-0587	408C	R	Box	2	3.00		Liquid		Poor	0	BATTERY ELECTROLYTE.
CC-2140-0587	408C	R	Other	50	0.20	Battery	Solid			0	SMALL 1.5V DRY CELL BATTERIES FOR LAB EQUIPMENT.
CC-2140-0587	408C	R	High Pressure	1	0.00	Gas	Gas			0	SPRAY PAINT CAN.
CC-2140-0587	408C	R	Other	2	40.00	Lubricant	Liquid			0	10-GAL. GREASE PUMPS.
CC-2141-0587	408C	R	5 Gallon Can	1	5.00	Lubricant	Liquid			0	INTERNATIONAL HY-TRAN FLUID.
CC-2141-0587	408C	R	Other	5	1.00	Lubricant	Liquid			0	MISC. CONTAINERS OF POSSIBLE OIL RESIDUES.
CC-2141-0587	408C	R	Drum: Bung Top	2	110.00	Lubricant	Liquid			0	MOTOR OIL.
CC-2141-0587	408C	R	Drum: Bung Top	1	55.00	Lubricant	Liquid			0	HYDRAULIC OIL
CC-2141-0587	408C	R	Drum: Bung Top	1	55.00	Lubricant	Liquid		Good	0	AUTOMATIC TRANSMISSION FLUID.

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CC-2142-0587	408C	R	5 Gallon Can	1	5.00	Lubricant	Liquid		Good	0	B/B LUBRICATING, HYDRAULIC, OR MOTOR OIL.
CC-2142-0587	408C	R	Other	1	20.00	Lubricant	Liquid			0	20-GAL. OF MULTI-PURPOSE GREASE.
CC-2142-0587	408C	R	Drum: Open Top	1	40.00	Solvent	Liquid	Clear	Fair	1000	(2142A) DRUM LABEL ISOPROPYL ALCOHOL AND 3/4 FULL. FLASHPOINT < 0C.
CC-2142-0587	408C	R	Other	20	10.00	Mixture	Liquid			0	MISC. GREASE, OIL AND PAINT.
CC-2142-0587	408C	R	5 Gallon Can	1	0.67	Empty				0	UNKNOWN.
CC-2142-0587	408C	R	1 Gallon Can	1	0.13	Empty				0	FUEL CAN.
CC-2143-0587	408C	R	Drum: Bung Top	1	55.00	Unknown	Liquid			0	UNKNOWN. DRUM MODIFIED.
CC-2144-0587	408C	S	1 Gallon Can	4	1.00	Solvent	Liquid			0	1-GAL. FUEL CANS, FULL.
CC-2144-0587	408C	S	Other	1	0.10	Chemicals	Liquid			0	SMALL 4 OZ. BOTTLE CONTAINING MERCURY.
CC-2144-0587	408C	S	5 Gallon Can	1	5.00	Solvent	Liquid			0	5-GAL. FUEL CAN, FULL.
CC-2144-0587	408C	S	Other	19	1.00	Lubricant	Liquid			0	MISC. JARS OF OILS, GREASE, AND INK.
CC-2144-0587	408C	S	5 Gallon Can	2	7.00	Solvent	Liquid			0	POLYCLAD.
CC-2144-0587	408C	S	Other	4	1.00	Solvent	Liquid			0	JARS OF CLEANING COMPOUND.
CC-2144-0587	408C	S	Other	2	0.10	Battery	Solid			0	SMALL 6-VOLT BATTERIES.
CC-2144-0587	408C	S	Drum: Open Top	1	7.35	Trash	Solid			0	DRUM OF RAGS.
CC-2147-0587	408C	W/O	Other	1	0.00	Battery	Solid			0	AUTOMOTIVE BATTERY.

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CC-2122-0587	408D	N	5 Gallon Can	2	0.00	Empty				0	EMPTY FUEL CANS.
CC-2122-0587	408D	N	Bottle	1	0.00	Empty				0	GLASS CARBOY IN WOOD BOX.
CC-2122-0587	408D	N	Bottle	1	0.00	Empty				0	EMPTY 1 GALLON JAR.
CC-2123-0587	408D	N	Drum: Bung Top	1	55.00	Solvent	Liquid	Clear	Fair	100	CHLORINATED HYDROCARBONS, MONSANTO, INERTEEN. FLASHPOINT = 102C.
CC-2124-0587	408D	N	Drum: Open Top	2	14.70	Unknown	Solid	White	Good	0	2 OPEN - POSSIBLY OVERPACK - WHITE POWDER.
CC-2124-0587	408D	N	Drum: Open Top	1	55.00	Unknown	Liquid			0	RUSTED OPEN.
CC-2124-0587	408D	N	Drum: Open Top	1	55.00	Solvent	Liquid			0	WITH SPIGOT ON CART. "ISOPROPYL ALCOHOL".
CC-2124-0587	408D	N	Drum: Bung Top	3	22.06	Base	Liquid			0	WITH SPIGOT, INDUSTRIAL SOAP CO., "JANITOR SUPPLIES".
CC-2218-0587	408D	N/O	Other	1	0.00	Battery	Solid			0	BATTERY IN TRUCK PARKED OUTSIDE. E-06339.
CC-2121-0587	408D	O	Other	3	20.00	Unknown	Liquid			0	DEHYDRATING AGENT IN 20-GAL. DRUM.
CC-2125-0587	408D	O	Jar	4	0.50	Solvent	Liquid		Good	0	4-8OZ SUPER-SOLV JARS.
CC-2125-0587	408D	O	1 Gallon Can	1	1.00	Lubricant	Liquid			0	HONING OIL
CC-2125-0587	408D	O	Jar	3	0.10	Solvent	Liquid			0	INK, DIP-IT CLEANER.
CC-2125-0587	408D	O	Bottle	1	1.00	Solvent	Liquid			0	ANTIRADIOACTIVE CLEANING COMPOUND.
CC-2126-0587	408D	O	Gas Cylinder	3	0.00	Gas	Gas		Good	0	FREON, 15 POUNDS.

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CC-2126-0587	408D	0	Gas Cylinder	2	0.00	Gas	Gas		Good	0	UNKNOWN GAS CYLINDERS.
CC-2126-0587	408D	0	Gas Cylinder	1	0.00	Gas	Gas		Good	0	5 POUND AMMONIA CYLINDER.
CC-2126-0587	408D	0	High Pressure	1	0.00	Gas	Gas			0	SPRAY PAINT CAN.
CC-2127-0587	408D	0	1 Gallon Can	1	1.00	Unknown				0	UNKNOWN 1-GAL.
CC-2127-0587	408D	0	1 Gallon Can	1	0.00	Unknown				0	1-GAL. UNKNOWN, PROBABLY EMPTY.
CC-2127-0587	408D	0	5 Gallon Can	1	0.00	Empty				0	EMPTY.
CC-2127-0587	408D	0	Other	1	1.34	Unknown	Solid			0	10-GAL. CONTAINER WITH MISC. CONTENTS (DRY POWDER, ETC.).
CC-2128-0587	408D	0	5 Gallon Can	22	14.70	Unknown	Solid	White	Fair	0	ANSUL MET-L-X DRY POWDER FOR FIRE EXTINGUISHERS. HEAVY POWDER. FLASHPOINT = 32C.
CC-2129-0587	408D	0	5 Gallon Can	2	1.34	Unknown	Solid			0	ANSUL FORAY DRY CHEMICAL.
CC-2130-0587	408D	0	Bag	25	13.00	Unknown	Solid	White	Fair	0	80 POUND ANSUL WHITE POWDER. FLASHPOINT = 71C.
CC-2131-0587	408D	0	Fiberboard	1	4.00		Solid			0	"BIOMACHINE LAKESEAL" SODIUM SILICATE.
CC-2131-0587	408D	0	5 Gallon Can	2	1.34		Solid			0	REDUCED IRON.
CC-2131-0587	408D	0	Gas Cylinder	4	0.00	Gas	Gas			0	SILICONE SPRAY CANS.
CC-2131-0587	408D	0	Drum: Open Top	1	65.00		Solid	Brown	Fair	0	BLACK 55-GALLON DRUM. APPEARS TO CONTAIN VERMICULITE AND ELECTRIC WIRES.
CC-2131-0587	408D	0	Drum: Open Top	1	55.00	Solvent	Liquid			0	COMPOUND MR-2000.

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CC-2131-0587	408D	0	Drum: Open Top	1	25.00					0	UNKNOWN 25-GAL. DRUM.
CC-2131-0587	408D	0	Jar	2	0.00	Solvent				0	2-8OZ SUPER-SOLV.
CC-2131-0587	408D	0	Drum: Open Top	2	10.69		Liquid	Black		0	40-GAL. GENERAL ELECTRIC PYRANOL (PCBS).
CC-2132-0587	408D	0	Fiberboard	4	4.00	Chemicals	Solid			0	25 POUND MAGNESIUM OXIDE CONTAINERS.
CC-2215-0587	408D	0	Bottle	3	2.00	Unknown	Liquid			0	1 GALLON CONTAINERS OF UNKNOWN.
CC-2215-0587	408D	0	Bottle	2	0.00	Empty				0	EMPTY ONE GAL. CONTAINERS.
CC-2108-0587	408E	E	Other	6	0.10	Mixture	Liquid			0	MISCELLANEOUS MATERIALS. SMALL QUANTITY CANS, BOTTLES, JARS ETC.
CC-2241-0587	409	A	1 Gallon Can	2	1.00	Solvent	Liquid			0	1-GAL. BX DUPLICATING FLUID.
CC-2242-0587	409	B	Drum: Open Top	1	7.35	Trash	Solid			0	FILLED WITH TRASH.
CC-2243-0587	409	C	1 Gallon Can	35	20.00	Chemicals	Liquid			0	1-GAL. PLASTIC CONTAINERS, FULL AND PARTIALLY FULL; INCLUDING HYPONEUTRALIZER, EKTRACHROME FILM, ETC.
CC-2243-0587	409	C	Jar	7	2.00	Chemicals	Liquid			0	1-GAL. GLASS JARS.
CC-2243-0587	409	C	1 Gallon Can	5	2.00	Unknown	Liquid			0	1-GAL. METAL CONTAINERS.
CC-2243-0587	409	C	Bottle	100	5.00	Chemicals	Liquid			0	1/2 PINT AND PINT CONTAINERS OF FILM DEVELOPERS.
CC-2243-0587	409	C	Bottle	12	3.00	Chemicals	Liquid			0	QUART BOTTLES OF RAPID FIXER.
CC-2243-0587	409	C	Other	1	0.10	Chemicals	Liquid			0	ONE CONTAINER OF INDIA INK.

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CC-2244-0587	409	D	Other	1	0.00	Empty				0	EMPTY 25-GALLON AMMONIA CONTAINER.
CC-2245-0587	409	E	1 Gallon Can	8	8.00	Unknown	Liquid			0	1-GALLON PLASTIC CONTAINERS.
CC-2245-0587	409	E	Drum: Open Top	3	0.00	Empty				0	3 TRASH DRUMS - EMPTY.
CC-2245-0587	409	E	1 Gallon Can	4	4.00	Unknown	Liquid	Blue		0	1-GALLON CONTAINERS FILLED WITH UNKNOWN BLUE-GREEN LIQUID.
CC-2245-0587	409	E	Other	8	2.00	Unknown	Liquid			0	UNKNOWN 1 QUART CONTAINERS.
CC-2265-0587	410	4	Other	200	0.00	Chemicals	Solid			0	200 METAL CONTAINERS. PROBABLY EMPTY.
CC-2246-0587	410	A	5 Gallon Can	2	0.27		Solid			0	PASTE WAX.
CC-2246-0587	410	A	1 Gallon Can	1	0.50	Water	Liquid			0	1 GAL PLASTIC BOTTLE WINDSHIELD CLEANER.
CC-2246-0587	410	A	Other	1	0.10	Base	Liquid			0	1 QT PLASTIC BOTTLE SODIUM HYDROXIDE
CC-2246-0587	410	A	1 Gallon Can	1	1.00	Solvent	Liquid			0	FLOOR POLISH REMOVER.
CC-2246-0587	410	A	Box	5	0.00		Solid			0	SPACKLING COMPOUND.
CC-2246-0587	410	A	Bottle	3	2.00	Solvent	Liquid			0	3M ACTIVATOR FLUID FOR COPIERS (ONE EMPTY).
CC-2271-0587	410	AA	Jar	3	0.50	Chemicals	Liquid			0	1 QT GLASS BOTTLES CONTAINING DEXTROSE.
CC-2271-0587	410	AA	Jar	12	3.00	Chemicals	Liquid		Good	0	12 1-QT JARS OF CITROCARBONATE.
CC-2271-0587	410	AA	Bag	6	0.50	Base	Solid		Poor	0	6 1-POUND BAGS OF SODIUM BICARBONATE.
CC-2271-0587	410	AA	1 Gallon Can	2	0.05	Base	Solid			0	1-POUND CAN OF EPSOM SALT.

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CC-2271-0587	410	AA	Other	4	0.01	Chemicals	Liquid			0	CLINITEST FOR URINE SUGAR. "POISON".
CC-2271-0587	410	AA	Box	5	5.00	Chemicals	Liquid			0	LAXATIVES.
CC-2271-0587	410	AA	Jar	10	0.00	Chemicals	Liquid			0	1-GAL JARS OF MINERAL OIL, CALAMINE LOTION, ETC.
CC-2271-0587	410	AA	Jar	12	3.00	Chemicals	Liquid			0	MISC.: ACIDS, MEDICAL COMPOUNDS.
CC-2271-0587	410	AA	Jar	12	1.50	Chemicals	Liquid		Poor	0	12 1-PINT, UNKNOWN AND CORRODED.
CC-2271-0587	410	AA	Jar	12	0.01	Chemicals	Liquid			0	KAMFOLENE SOLUTION. 4OZ JAR.
CC-2271-0587	410	AA	Other	30	2.00	Chemicals	Liquid			0	MISC. JARS AND BOXES OF MEDICAL SUPPLIES.
CC-2271-0587	410	AA	Other	5	2.00	Solvent	Liquid			0	CLEANERS AND 1/2 PT. OF PAINT.
CC-2247-0587	410	B	5 Gallon Can	1	5.00	Solvent	Liquid			0	WITT-O-GREEN CLEANER DISINFECTANT.
CC-2247-0587	410	B	5 Gallon Can	1	0.00	Empty				0	EMPTY SS CAN.
CC-2247-0587	410	B	Other	4	1.00	Mixture	Liquid			0	ISOPROPYL ALCOHOLS,, CLEANING FLUID, HAND CLEANERS.
CC-2272-0587	410	BB	Jar	4	0.05	Solvent	Liquid			0	3 2-OZ OF INK AND 1 1-OZ OF ERASING FLUID.
CC-2272-0587	410	BB	Other	1	0.01	Solvent	Liquid			0	LIQUID WRENCH. 8OZ CAN.
CC-2272-0587	410	BB	Jar	1	0.25	Solvent	Liquid			0	16 OZ OF SUPER SOLV
CC-2272-0587	410	BB	Jar	1	0.25	Unknown	Liquid			0	QUART CAN OF UNKNOWN CONTENTS.
CC-2272-0587	410	BB	Jar	1	0.05	Lubricant	Liquid			0	1-POUND JAR OF VASELINE JELLY.

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CC-2272-0587	410	BB	Other	4	0.05	Solvent	Liquid			0	MISC.: CLEANERS, ADHESIVES, ETC.
CC-2248-0587	410	C	Bottle	1	1.00	Unknown	Liquid			0	UNKNOWN CONTENTS.
CC-2248-0587	410	C	Other	1	0.00	Battery	Solid			0	INDUSTRIAL BATTERY.
CC-2249-0587	410	D	Bottle	1	1.00	Solvent	Liquid			0	1-GALLON PLASTIC CONTAINER OF ALCOHOL
CC-2249-0587	410	D	1 Gallon Can	1	1.00	Paint	Liquid	Yellow		0	1-GALLON OF "POSTER PERFECT" YELLOW PAINT
CC-2249-0587	410	D	5 Gallon Can	1	0.67	Empty			Fair	0	5-GAL. FUEL CAN.
CC-2249-0587	410	D	Box	1	0.50		Solid			0	CASE (~24 CONTAINERS) OF SALT TABLETS.
CC-2249-0587	410	D	Bottle	1	0.50	Unknown	Liquid	Yellow		0	UNKNOWN HEAVY YELLOW LIQUID
CC-2249-0587	410	D	Bottle	1	2.00	Acid	Liquid			0	2 POUND OF NITRIC ACID.
CC-2249-0587	410	D	Other	10	1.00	Chemicals	Liquid			0	MISC: ALCOHOL, CLEANING COMP., MERCUROCHROME, ETC.
CC-2250-0587	410	E	Box	2	1.00		Solid			0	2 POUND BOXES OF "SBS SKIN CLEANER".
CC-2250-0587	410	E	High Pressure	1	0.00	Empty				0	3 AEROSOL PAINT CANS.
CC-2250-0587	410	E	Jar	1	0.10	Chemicals	Liquid		Good	0	SMALL JAR OF MERCURY.
CC-2250-0587	410	E	Jar	1	0.25	Solvent	Liquid			0	16 OZ OF "SUPER-SOLV".
CC-2250-0587	410	E	5 Gallon Can	1	2.00	Solvent	Liquid			0	DEWITT INDUSTRIAL MAINTENANCE CLEANER.
CC-2250-0587	410	E	Other	5	0.50	Solvent	Liquid			0	MISC.: GREASE, RUBBER ADHESIVE, BLACK INK, ETC.

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CC-2299-0587	410	E/O	Gas Cylinder	1	0.00	Gas	Gas			0	SMALL 16 OZ. PROPANE BOTTLE.
CC-2251-0587	410	F	Other	2	0.50		Solid			0	1-POUND SODA ACID CHARGE FOR FIRE EXTINGUISHERS.
CC-2251-0587	410	F	5 Gallon Can	9	3.35		Solid		Fair	0	MET-L-X DRY POWDER FOR FIRE EXTINGUISHERS, FULL & RUSTED.
CC-2251-0587	410	F	1 Gallon Can	1	1.00	Solvent	Liquid			0	1-GAL OF SAFETY SOLV.
CC-2251-0587	410	F	Jar	1	0.25		Liquid			0	16 OZ OF "SUPER-SOLV".
CC-2251-0587	410	F	Drum: Open Top	1	0.00	Empty				0	
CC-2251-0587	410	F	Other	20	3.00		Solid		Fair	0	OXYGEN-GENERATION CANISTERS FOR MSA RESPIRATORS.
CC-2252-0587	410	G	1 Gallon Can	1	1.00	Paint	Liquid	Red	Good	0	1-GAL OF INDUSTRIAL FINISH ENAMEL - RED.
CC-2252-0587	410	G	1 Gallon Can	2	0.27	Unknown	Solid			0	1-GAL. METALLIC MORTOR BY CHEMTREE.
CC-2253-0587	410	H	Box	1	0.01	Base	Solid			0	1 1/2 POUNDS OF TIDE.
CC-2253-0587	410	H	1 Gallon Can	1	0.50	Lubricant	Liquid	Black		0	BLACK LIQUID, POSSIBLY OIL, ONOX.
CC-2253-0587	410	H	Jar	1	0.10	Solvent	Liquid			0	SUPER SOLV CLEANER CONTAINING DARK LIQUID.
CC-2253-0587	410	H	Other	1	2.00	Water	Liquid	Black		0	2-GAL BUCKET CONTAINING DARK LIQUID - POSSIBLY STANDING WATER.
CC-2254-0587	410	I	Tank	1	0.00	Water	Liquid		Good	0	ASBESTOS TANK 2.5'D X 4'H. PROBABLY EMPTY.
CC-2254-0587	410	I	Box	1	0.00		Solid			0	BOX OF ASBESTOS ROPE.

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CC-2257-0587	410	J	Drum: Open Top	1	55.00	Unknown	Liquid		Poor	0	YELLOW DRUM LABELED "TESTED 9/77 DOT R1117".
CC-2257-0587	410	J	1 Gallon Can	1	1.00	Lubricant	Liquid			0	COFFEE CAN WITH OILY LIQUID.
CC-2258-0587	410	K	5 Gallon Can	1	5.00	Lubricant	Liquid	Black		0	THICK BLACK LIQUID.
CC-2258-0587	410	K	Other	1	0.10	Solvent	Liquid			0	FEND-X HAND CREAM.
CC-2258-0587	410	K	Tank	2	0.00	Water	Liquid		Good	0	ASBESTOS LINED TANKS, 6'D X 12'H. PROBABLY EMPTY.
CC-2258-0587	410	K	Drum: Bung Top	1	55.00	Solvent	Liquid		Good	0	ETHYLENE OXIDE NONIONIC (MONYL PHENOL) WITH SPIGOT.
CC-2258-0587	410	K	1 Gallon Can	3	2.00	Solvent	Liquid		Good	0	FUEL CANS.
CC-2258-0587	410	K	Other	1	0.00		Solid			0	SALT SHAKER OF UNKNOWN CONTENTS.
CC-2258-0587	410	K	5 Gallon Can	1	5.00	Lubricant	Liquid			0	PAIL OF OILY LIQUID.
CC-2259-0587	410	L	5 Gallon Can	1	0.67		Solid			0	HEAVY DUTY DRY RINSE.
CC-2259-0587	410	L	Bottle	1	0.10	Chemicals	Liquid		Good	0	4-OZ GLASS OF WADE'S CAINFENAL SOLUTION - GLYCERINE AND WITCH HAZEL.
CC-2259-0587	410	L	Other	3	0.10	Solvent	Liquid			0	MISC.: CLEANERS, ETC.
CC-2260-0587	410	M	Bottle	1	1.00	Base	Liquid		Good	0	ONOX SKIN TOUGHENER
CC-2260-0587	410	M	1 Gallon Can	1	1.00	Lubricant	Liquid			0	TRANSMISSION FLUID.
CC-2260-0587	410	M	1 Gallon Can	1	1.00	Unknown	Liquid			0	INSECTICIDE.
CC-2260-0587	410	M	Other	15	1.00	Mixture	Liquid			0	MISC.: SOLVENT, CLEANERS, ENAMEL, INK, SALT TABLETS, ETC.

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CC-2261-0587	410	N	Drum: Open Top	1	55.00	Solvent	Liquid			0	JOHNSON'S.
CC-2261-0587	410	N	Drum: Open Top	1	5.00	Solvent	Liquid			0	CONTAINS 1-GAL CANS AND MISC. CANS OF STERNO.
CC-2261-0587	410	N	5 Gallon Can	3	5.00	Unknown	Liquid		Poor	0	2 EMPTY, 1 FULL. CORRODED AND SPILLED.
CC-2255-0587	410	N/O	Tank	1	200.00	Solvent	Liquid	Brown	Fair	75	RUSTED FUEL TANK, 5'D X 12'H. FLASHPOINT = 63C.
CC-2274-0587	410	N/O	Drum: Open Top	1	0.00	Empty				0	EMPTY AND RUSTED THROUGH ON SIDE.
CC-2262-0587	410	P	5 Gallon Can	2	0.00	Empty				0	EMPTY 5-GAL CARBOYS.
CC-2262-0587	410	P	Bottle	1	0.00	Empty				0	EMPTY 1-GAL BOTTLE.
CC-2262-0587	410	P	Bottle	1	0.25	Unknown	Liquid			0	QUART OF BROWNISH LIQUID.
CC-2263-0587	410	Q	Jar	1	0.13	Chemicals	Solid			0	1-GAL GLASS JAR OF MAGNESIUM SULFATE.
CC-2263-0587	410	Q	Bottle	1	1.00	Base	Liquid			0	PLASTIC BOTTLE OF SOAP.
CC-2263-0587	410	Q	Other	1	0.10	Solvent	Liquid			0	BOTTLE OF INK.
CC-2263-0587	410	Q	Other	20	0.10	Chemicals	Liquid			0	TETANUS TOXIOD ALUM.
CC-2263-0587	410	Q	Bottle	52	0.50	Mixture	Liquid			0	MISC BOTTLES OF MEDICINE: COUGH SYRUP, ASPIRIN, LISTERINE, EYE WASH, CHLORASEPTIC, ETC.
CC-2264-0587	410	S	Bottle	1	1.00	Solvent	Liquid			0	PLASTIC BOTTLE OF KEROSENE.
CC-2264-0587	410	S	Jar	1	0.10	Unknown	Liquid			0	UNKNOWN CLEAR LIQUID
CC-2264-0587	410	S	1 Gallon Can	2	0.00	Empty				0	EMPTY 1-GAL PLASTIC JARS.

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CC-2264-0587	410	S	Bottle	3	0.10	Chemicals	Liquid			0	50 ML BOTTLES OF UNKNOWN.
CC-2264-0587	410	S	Bottle	5	0.50	Solvent	Liquid			0	1-PINT BOTTLES OF GENERAL PURPOSE INK.
CC-2264-0587	410	S	Bottle	1	0.50	Unknown	Liquid			0	UNKNOWN CLEAR LIQUID.
CC-2264-0587	410	S	Bottle	1	0.01	Unknown	Solid			0	METAL CUTTINGS ON BLACK MATERIAL.
CC-2268-0587	410	S	Box	5	1.00	Chemicals	Solid			0	5-17 POUND BOXES OF SODIUM CARBONATE.
CC-2256-0587	410	S/O	Drum: Open Top	3	0.00	Empty				0	ONE EMPTY, 2 POSSIBLY EMPTY.
CC-2265-0587	410	U	Bottle	1	2.00	Unknown	Liquid			0	PARTICALLY FULL 10 GALLON CARBOY.
CC-2265-0587	410	U	1 Gallon Can	85	60.00	Unknown	Liquid			0	UNKNOWN.
CC-2265-0587	410	U	Bottle	2	2.00	Base	Liquid			0	2 GAL. SODIUM HYDROXIDE.
CC-2265-0587	410	U	Bottle	1	1.00	Acid	Liquid			0	NITRIC ACID
CC-2265-0587	410	U	Jar	25	2.00	Chemicals	Liquid			0	MISC.: LAB CHEMICALS, LAB REAGENTS, ACID, ETC.
CC-2266-0587	410	V	Jar	1	0.27	Chemicals	Solid			0	2-GAL OF CALCIUM CHLORIDE.
CC-2266-0587	410	V	Bottle	1	1.00	Solvent	Liquid		Good	0	1-GAL OF ACETONE.
CC-2266-0587	410	V	Other	15	2.00	Chemicals	Liquid			0	MISC.: CHEMICALS.
CC-2267-0587	410	W	Bottle	2	0.00	Empty				0	EMPTY 5-GAL CARBOYS.
CC-2267-0587	410	W	Bottle	1	0.27	Unknown	Liquid			0	2-GAL CARBOY
CC-2267-0587	410	W	5 Gallon Can	1	2.00	Unknown			Poor	0	UNKNOWN, HALF CORRODED AND SPILLED.

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CC-2267-0587	410	W	Other	1	0.00	Unknown	Solid			0	CARDBOARD SHIPPING TUBE LABELED "RADIOACTIVE MATERIAL".
CC-2268-0587	410	X	Bottle	1	2.00	Chemicals	Liquid			0	2-GAL OF CONCENTRATED SODIUM THIOSULFATE.
CC-2268-0587	410	X	Bottle	1	0.25	Unknown	Liquid			0	16 OZ BOTTLE CONTENTS UNKNOWN.
CC-2268-0587	410	X	Bottle	1	0.25	Unknown	Liquid			0	16-OZ SQUEEZE BOTTLE. CONTENTS UNKNOWN.
CC-2269-0587	410	X	Jar	12	0.20	Chemicals	Solid			0	12 16-OZ JARS OF SODIUM FLUORIDE.
CC-2269-0587	410	Y	Jar	1	0.01	Chemicals	Solid			0	JAR OF ALUMINUM NITRATE.
CC-2269-0587	410	Y	Bottle	1	0.01	Chemicals	Solid			0	8-OZ JAR LABEL "KOI" WITH CRYSTALS ON THE BOTTOM.
CC-2269-0587	410	Y	Jar	10	2.00	Acid	Liquid			0	SULFURIC AND ACETIC ACID.
CC-2269-0587	410	Y	Jar	1	1.00	Acid	Liquid			0	PHOSPHORIC ACID.
CC-2269-0587	410	Y	Bottle	5	1.00	Unknown	Liquid			0	16 OZ BOTTLE, LABELED KEL-F 300.
CC-2269-0587	410	Y	Other	1	0.10	Unknown	Liquid			0	EYE DROPPER WITH UNKNOWN LIQUID.
CC-2269-0587	410	Y	Bottle	2	0.50	Solvent	Liquid			0	2 1-QT OF ISOPROPYL ALCOHOL.
CC-2269-0587	410	Y	Bottle	1	10.00	Unknown	Liquid			0	10-GAL CARBOY OF UNKNOWN LIQUID
CC-2270-0587	410	Y	Other	10	0.13	Gas	Gas		Good	0	AEROSOL CONTAINERS.
CC-2270-0587	410	Y	Other	20	5.00	Mixture	Liquid			0	MISC.: NITRIC ACID, LEAD OXIDE, SULFURIC ACID, ETHYL ALCOHOL, SULFONIC ACID.

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CC-2270-0587	410	Z	5 Gallon Can	1	5.00	Solvent	Liquid			0	HEXANE
CC-2270-0587	410	Z	Bottle	1	0.50	Solvent	Liquid		Good	0	CARBON TETRACHLORIDE
CC-2175-0587	412	A	Jar	2	0.50		Liquid	Black	Fair	0	16 OZ. JARS
CC-2175-0587	412	A	High Pressure	3	0.00	Empty				0	AEROSOL CANS - RUSTED. LABELED "FINISH COAT".
CC-2175-0587	412	A	Can	1	0.00	Empty				0	10-GALLON FUEL CAN.
CC-2175-0587	412	A	Other	1	1.34	Trash	Liquid		Fair	0	10-GALLON TRASH CAN.
CC-2174-0587	412	B	Other	58	0.00	Battery	Solid		Fair	0	INDUSTRIAL BATTERIES.
CC-2213-0587	413	A	5 Gallon Can	1	0.00	Empty				0	EMPTY QUAKER MAID CAN
CC-2213-0587	413	A	Tank	1	0.00	Empty				0	EMPTY 4'D X 7'H TANK.
CC-2214-0587	413	E/O	Tank	1	0.00	Empty				0	EMPTY 18'D X 25'H TANK.
CC-2215-0587	413	S/O	Tank	1	0.00	Empty				0	EMPTY 5'D X 20'H TANK.
CC-2171-0587	414	E/O	Other	2	0.00	Solvent	Liquid		Fair	0	LOCOMOTIVE WITH GAS TANK AND BATTERY.
CC-2172-0587	414	S/O	Tank	1	50.00	Solvent	Liquid	Black	Fair	80	5'D X 8'H MODIFIED, FUEL TANK WITH 4 INCHES OF FLUID IN BOTTOM. SAMPLE WAS GRITTY. FLASHPOINT > 110C.
CC-2064-0587	417	A	Drum: Bung Top	0	55.00	Unknown	Liquid		Fair	0	55-GALLON DRUM, CONTENTS UNKNOWN.
CC-2065-0587	417	A	Drum: Bung Top	1	55.00	Solvent	Liquid		Poor	0	RUSTED 55-GALLON DRUM.

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CC-2066-0587	417	A	Drum: Bung Top	4	70.00	Lubricant	Liquid		Poor	0	4 30-GALLON DRUMS OF METALUBE. ALL BADLY STAINED, ONE LEAKING.
CC-2067-0587	417	A	Drum: Bung Top	1	55.00	Unknown	Liquid		Fair	0	55-GALLON DRUM OF UNKNOWN.
CC-2068-0587	417	A	Drum: Bung Top	3	140.00	Lubricant	Liquid		Fair	0	2-55 GAL, 1-30 GAL, "LUBRIPLATE" (?).
CC-2069-0587	417	A	Drum: Bung Top	1	10.00	Solvent	Liquid		Poor	0	55-GALLON DRUM ON CART WITH LEAKING SPIGOT.
CC-2070-0587	417	A	Drum: Bung Top	1	50.00	Lubricant	Liquid		Poor	0	MOTOR OIL CONTAINER, BULGED, OPENED, SAME CONTENTS INSIDE.
CC-2071-0587	417	A	Drum: Bung Top	1	40.00	Lubricant	Liquid		Fair	0	55-GALLON WITH SPIGOT ON CART. "MELCOLENE"
CC-2072-0587	417	A	Drum: Bung Top	1	55.00	Lubricant	Liquid		Fair	0	20/20 WEIGHT MOTOR OIL (TEXACO) WITH SPIGOT.
CC-2073-0587	417	A	Drum: Bung Top	3	55.00	Solvent			Fair	0	3 55-GALLON, ONE WITH SPIGOT, EMPTY.
CC-2074-0587	417	A	Drum: Bung Top	1	55.00	Solvent	Liquid		Fair	0	WITH SPIGOT ON CART.
CC-2075-0587	417	A	5 Gallon Can	3	2.00	Unknown	Liquid		Fair	0	
CC-2076-0587	417	B	Other	290	5.00	Paint	Solid			0	MISC. CONTAINERS OF UNKNOWNS AND PAINT PRODUCTS.
CC-2077-0587	417	B	5 Gallon Can	60	150.00	Paint	Liquid		Fair	0	INCLUDES: POLYCLAD, RUSTBOND PRIMER, CORROSIVE PROTECTIVE COATINGS, EPOXY, AND CATALYSTS.
CC-2078-0587	417	B	5 Gallon Can	9	30.00	Paint	Liquid		Fair	0	"COOK'S COROVEL LATEX FINISH".
CC-2079-0587	417	B	5 Gallon Can	4	10.00	Solvent	Liquid			0	BOILED INEDIBLE LINSEED OIL.

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CC-2079-0587	417	B	1 Gallon Can	1	1.00	Solvent	Liquid			0	SOLVENT.
CC-2079-0587	417	B	High Pressure	1	0.00	Gas	Gas		Fair	0	SPRAY PAINT BOTTLE, 12 OZ.
CC-2080-0587	417	B	1 Gallon Can	85	50.00	Solvent	Liquid		Poor	0	PAINT AND THINNERS, RUSTED.
CC-2081-0587	417	B	Drum: Bung Top	2	55.00	Solvent	Liquid	Clear	Poor	120	55-GALLON. TOP RUSTED. POSSIBLY EMPTY. ONE OPEN, ONE CLOSED. FLASHPOINT 14C.
CC-2082-0587	417	B	Drum: Bung Top	1	55.00	Solvent	Liquid	Clear	Fair	1600	55-GALLON OF METHYL ISOBUTYL KETONE. DRUM CLOSED. FLASHPOINT = 15C.
CC-2083-0587	417	B	Other	23	5.00	Paint	Liquid		Fair	0	6 SPRAY PAINT CANS, 4 1-GAL PAINT CANS, 5 1-PT PAINT REDUCER, 8 1-QT PAINT CANS.
CC-2084-0587	417	B	1 Gallon Can	4	2.00	Solvent	Liquid		Fair	0	"PHENOLINE THINNER".
CC-2084-0587	417	B	Other	3	1.00	Solvent	Liquid		Fair	0	1-QT CONTAINERS, "CATALYST".
CC-2084-0587	417	B	Other	5	2.00	Paint	Liquid		Fair	0	1/2 GAL OF EPOXY COMPOUND.
CC-2085-0587	417	B	Drum: Open Top	1	1.00	Paint	Solid	Green	Fair	0	55-GALLON CONTAINER CONTAINS SOLID MATERIAL RESEMBLING DRIED PAINT.
CC-2086-0587	417	B	1 Gallon Can	15	10.00	Paint	Liquid		Fair	0	PAINT CONTAINERS.
CC-2086-0587	417	B	5 Gallon Can	5	20.00	Solvent	Liquid		Fair	0	PAINT THINNER.
CC-2086-0587	417	B	Bottle	15	5.00	Solvent	Liquid			0	MISC.: MATERIALS INCLUDING BENZENE, ACIDS, AND CATALYSTS.
CC-2087-0587	417	B	Drum: Open Top	1	3.50	Trash	Solid		Fair	0	55-GALLONS, TRASH.
CC-2087-0587	417	B	5 Gallon Can	1	0.00	Paint	Liquid		Good	0	PRIMER WITH PRESSURE APPLICATOR.

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CC-2088-0587	417	C	Drum: Bung Top	3	80.00	Solvent	Liquid	Clear	Fair	0	1 POSSIBLY EMPTY. DRUM SAMPLED WAS HALF FULL. FLASHPOINT > 110C.
CC-2089-0587	417	C	Drum: Bung Top	1	50.00	Solvent	Liquid			0	55-GALLON DRUM WITH SPIGOT, RUSTED.
CC-2090-0587	417	C	5 Gallon Can	1	5.00	Tar	Liquid		Fair	0	TAR
CC-2090-0587	417	C	5 Gallon Can	1	5.00	Solvent	Liquid		Fair	0	SOLVENT.
CC-2091-0587	417	C	1 Gallon Can	50	40.00	Paint	Liquid		Fair	0	MISC. PAINTS.
CC-2092-0587	417	C	Drum: Open Top	6	150.00	Solvent	Liquid		Fair	0	40-GALLON DRUMS.
CC-2092-0587	417	C	5 Gallon Can	5	5.00	Solvent	Liquid		Fair	0	
CC-2092-0587	417	C	Other	5	2.00	Lubricant	Liquid		Fair	0	LUBE GUNS.
CC-2092-0587	417	C	Other	8	2.00	Lubricant	Liquid		Fair	0	OIL CANS.
CC-2092-0587	417	C	Other	7	5.00	Lubricant	Liquid		Fair	0	1-GALLON LUBE GUNS.
CC-2092-0587	417	C	5 Gallon Can	1	3.00	Solvent	Liquid		Fair	0	5-GALLON FUEL CAN.
CC-2093-0587	417	C		14	50.00	Lubricant	Liquid		Fair	0	5-GALLON METAL CONTAINERS OF LUBRICANT.
CC-2093-0587	417	C	5 Gallon Can	2	10.00	Lubricant	Liquid		Fair	0	5-GALLON CONTAINERS OF HOT DIE LUBE BY FISKE.
CC-2093-0587	417	C	5 Gallon Can	5	20.00	Unknown	Liquid		Fair	0	"SUNISU".
CC-2094-0587	417	C	Drum: Bung Top	1	55.00	Lubricant	Liquid		Fair	0	LABELED "MOTOR OIL" AND "METHYLENE GLYCOL". DRUM HAS SPIGOT.
CC-2095-0587	417	C	Drum: Bung Top	1	55.00	Solvent	Liquid	Brown	Fair	540	UNKNOWN CONTENTS. FLASHPOINT = 12C.

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CC-2097-0587	417	C	Other	1	2.00		Liquid		Fair	0	2.5-GALLON FUEL CAN.
CC-2053-0587	417	E/O	Drum: Bung Top	2	0.00	Empty				0	2-55 GALLON DRUMS, 1 WITH MODIFIED TOP, BOTH PROBABLY EMPTY.
CC-2063-0587	417	E/O	Drum: Bung Top	2	0.00					0	55-GALLON DRUMS WITH MODIFIED TOPS, PROBABLY EMPTY.
CC-2148-0587	417	E/O	Other	3	0.00	Battery	Solid		Fair	0	3 CART BATTERIES.
CC-2148-0587	417	E/O	Other	4	20.00	Solvent	Liquid		Fair	0	4 5-GALLON GASOLINE TANKS ON VEHICLE.
CC-2148-0587	417	E/O	Other	4	0.00	Solvent	Liquid		Fair	0	4 40-GALLON GASOLINE TANKS. 2 ON EACH TRUCK. PROBABLY EMPTY.
CC-2149-0587	417	E/O	Other	2	0.00	Solvent	Liquid		Fair	0	2 20-GALLON GASOLINE TANK ON FORKLIFT. PROBABLY EMPTY.
CC-2150-0587	417	E/O	Other	2	0.00	Solvent	Liquid		Fair	0	2 30-GALLON GAS TANKS ON VEHICLE. PROBABLY EMPTY.
CC-2150-0587	417	E/O	Drum: Open Top	2	55.00	Unknown	Liquid		Poor	0	55-GALLON DRUMS: ONE MODIFIED, ONE BULGED ON THE BOTTOM.
CC-2150-0587	417	E/O	Drum: Bung Top	1	50.00	Solvent	Liquid		Poor	0	RUSTED WITH SPIGOT.
CC-2155-0587	417	S	Drum: Bung Top	1	0.00	Unknown	Liquid		Poor	0	RUSTED, DENTED 55-GALLON DRUM
CC-2155-0587	417	S	Other	1	0.00	Empty				0	CHEMICAL HAULER/TANKER, 1500 GALLON CAPACITY.
CC-2155-0587	417	S	Other	1	0.00	Empty				0	10-GALLON GAS CONTAINER ON CEMENT MIXER.
CC-2151-0587	417	S/O	Other	1	0.00	Battery	Solid		Fair	0	BATTERY
CC-2151-0587	417	S/O	Other	1	0.00	Empty	Gas		Fair	0	EMPTY AIR COMPRESSOR TANK.

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CC-2151-0587	417	S/O	Other	2	0.00	Solvent	Liquid		Fair	0	10-GALLON GAS TANKS. PROBABLY EMPTY.
CC-2152-0587	417	S/O	Other	4	0.00	Battery	Solid		Fair	0	4 BATTERIES ON PALLET.
CC-2152-0587	417	S/O	Other	1	0.00	Battery	Solid		Fair	0	BATTERY ON FORKLIFT.
CC-2152-0587	417	S/O	Other	2	0.00	Solvent	Liquid		Fair	0	10-GALLON GAS TANKS ON FORKLIFTS.
CC-2153-0587	417	S/O	Drum: Bung Top	12	100.00	Unknown	Liquid	Brown	Poor	15	5 55-GALLON DRUMS ARE EMPTY. OTHER ARE UNKNOWN. DRUM SAMPLED HAD A 2-PHASE LIQUID. LABELED TRIBUTYL PHOSPHATE. FLASHPOINT > 110C.
CC-2154-0587	417	S/O	Other	80	6.00	Battery	Solid		Fair	0	BATTERIES STACKED ON PALLETS.
CC-2182-0587	428	S/O	Other	2	0.00	Empty			Fair	0	2 PROPANE PRESSURE TANKS. EMPTY, VALVES OPEN ON BOTTOM. 29,950 GALLON EACH. 50'H X 10'D.
CC-2283-0587	431		5 Gallon Can	2	0.00	Empty				0	EMPTY.
CC-2283-0587	431		1 Gallon Can	1	1.00	Unknown	Liquid			0	CONTENTS UNKNOWN.
CC-2283-0587	431		Tank	1	62.80	Empty				0	4'D X 5'H.
CC-2283-0587	431		Gas Cylinder	1	0.00	Gas	Gas		Fair	0	16 OZ PROPANE CAN.
CC-2163-0587	432	E/O	Drum: Bung Top	1	0.00	Empty			Poor	0	55-GALLON, EMPTY AND RUSTED.
CC-2163-0587	432	E/O	Jar	1	0.25	Unknown	Liquid	Black	Good	0	16-OUNCE, HALF FULL OF BLACK LIQUID.
CC-2048-0587	433	A	Drum: Open Top	2	100.00	Lubricant	Liquid		Fair	0	MODIFED EMPTY 55-GALLON DRUMS LABELED "WASTE OIL".

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CC-2049-0587	433	A	Drum: Open Top	2	2.67	Unknown	Solid	White	Fair	0	10-GALLONS DRUMS OF POWDER.
CC-2049-0587	433	A	Drum: Open Top	1	2.67	Unknown	Solid	White	Fair	0	20-GALLON DRUM OF POWDER.
CC-2050-0587	433	A	Other	4	2.00		Solid		Poor	0	MSA CHEM-OX BREATHING APPARATUS.
CC-2050-0587	433	A	Other	1	0.00	Battery	Solid		Fair	0	BATTERY
CC-2050-0587	433	A	Box	1	0.20		Solid		Fair	0	OXYGEN-GENERATION CANNISTERS FOR MSA RESPIRATORS.
CC-2050-0587	433	A	1 Gallon Can	1	1.00	Lubricant	Liquid		Fair	0	OIL FILL CONTAINER.
CC-2050-0587	433	A	1 Gallon Can	1	1.00	Paint	Liquid		Fair	0	1-GALLON PAINT CAN.
CC-2050-0587	433	A	1 Gallon Can	1	1.00	Solvent	Liquid		Fair	0	1-GALLON GASOLINE CAN.
CC-2050-0587	433	A	5 Gallon Can	1	5.00	Solvent	Liquid		Fair	0	
CC-2050-0587	433	A	Other	1	0.00	Paint	Solid		Fair	0	ONE PAINTING MACHINE.
CC-2050-0587	433	A	Other	1	0.00	Empty				0	INSECTICIDE SPRAYER.
CC-2051-0587	433	A	5 Gallon Can	1	0.00	Empty				0	
CC-2051-0587	433	A	1 Gallon Can	1	0.00	Empty			Fair	0	
CC-2051-0587	433	A	Other	1	0.00	Empty			Fair	0	PAINTING MACHINE INCLUDING A PRESSURE TANK, GAS TANK AND PAINT CAN.
CC-2052-0587	433	A	Other	3	0.00	Solvent	Liquid		Fair	0	GAS TANKS ON VEHICLES. PROBABLY EMPTY.
CC-2052-0587	433	A	Other	1	0.00	Battery			Fair	0	BATTERY ON VEHICLE.

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CC-2054-0587	433	A	Other	3	0.00	Unknown	Solid		Fair	0	POSSIBLY DRY CHEMICAL FIRE EXTINGUISHER RECHARGE.
CC-2055-0587	433	A	Other	1	0.50					0	STEEL BUCKET FULL OF MISC. SMALL ITEMS.
CC-2055-0587	433	A	Other	4	0.00	Empty				0	4 MISC. CONTAINERS APPEAR EMPTY.
CC-2056-0587	433	A	Drum: Bung Top	1	55.00	Lubricant	Liquid		Fair	0	55-GALLONS OF HYDRAULIC FLUID.
CC-2060-0587	433	A	5 Gallon Can	1	5.00	Solvent	Liquid		Fair	0	LECITE BINDER.
CC-2055-0587	433	B	Drum: Bung Top	1	0.00	Empty				0	EMPTY 30-GALLON DRUM.
CC-2055-0587	433	B	Other	1	0.13	Unknown	Liquid		Fair	0	BRAMBLCIDE.
CC-2055-0587	433	B	Other	2	0.00	Empty				0	OLD GAS CANS.
CC-2057-0587	433	C	Drum: Bung Top	7	28.07	Unknown	Solid		Poor	1	30-GALLON DRUMS LABELED "SORBEAD" BY MOBIL. FLASHPOINT > 110C.
CC-2058-0587	433	D	Other	1	3.34	Unknown	Solid	Black	Fair	0	25-GALLLON CARDBOARD CONTAINER CONTAINING POWDER.
CC-2059-0587	433	D	Other	1	1.34	Paint	Solid		Fair	0	10-GALLON PRESSURE VESSEL, POSSIBLY PAINT.
CC-2060-0587	433	D	Drum: Bung Top	2	50.00	Unknown	Liquid		Fair	0	
CC-2060-0587	433	D	Drum: Open Top	1	7.35	Trash	Solid		Fair	0	55-GALLON DRUM OF TRASH.
CC-2060-0587	433	D	Other	2	5.00	Solvent	Liquid		Fair	0	1-GALLON AND 5-GALLON GAS CAN.
CC-2060-0587	433	D	Other	1	0.00	Battery	Solid		Fair	0	BATTERY.
CC-2060-0587	433	D	Other	20	20.00	Lubricant	Liquid		Fair	0	20-GALLON DRUM, MFG. B/B.

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CC-2060-0587	433	D	Other	9	1.00	Paint	Liquid		Fair	0	9 MISC. CANS OF PAINT OR VARNISH, 1-QT.
CC-2062-0587	433	D	Other	1	0.00	Empty			Fair	0	TRACTOR FUEL TANK, CAPACITY UNKNOWN. PROBABLY EMPTY.
CC-2061-0587	433	E	Other	1	10.00	Unknown	Liquid		Fair	0	10-GALLON PRESSURE VESSEL.
CC-2061-0587	433	E	Other	1	10.00	Solvent	Liquid		Fair	0	10-GALLON FUEL CONTAINER.
CC-2061-0587	433	E	5 Gallon Can	1	0.00	Empty			Fair	0	EMPTY 5-GALLON CONTAINER.
CC-2001-0587	435	A	Other	2	0.00	Empty			Fair	0	EMPTY TRASH PAILS.
CC-2001-0587	435	A	Other	1	0.00	Empty				0	EMPTY 25-GALLON WATER CONTAINER.
CC-2002-0587	435	A	Other	1	0.00	Empty			Fair	0	THERMOS.
CC-2003-0587	435	A	Drum: Bung Top	2	15.00	Unknown	Liquid	Yellow	Fair	3	ON PALLET, 1/3 FULL. PCB ANALYSIS < 2 PPM. FLASHPOINT (2003A) = 37C. FLASHPOINT (2003AA) <0C.
CC-2004-0587	435	A	Drum: Bung Top	1	55.00	Unknown	Liquid		Fair	0	
CC-2006-0587	435	A	Drum: Open Top	1	45.00	Lubricant	Liquid	Yellow	Good	60	HALF FULL OF CLEAR, LIGHT LIQUID, 3/4 FULL. PCB ANALYSIS = 28,000 PPM. FLASHPOINT < 0C.
CC-2007-0587	435	A	Drum: Open Top	2	55.00	Lubricant	Liquid	Brown	Fair	20	DARK LIQUID, 3/4 AND 1/4 FULL DRUMS. 55-GALLON. PCB'S < 2 PPM. FLASHPOINT > 110C.
CC-2008-0587	435	A	Drum: Bung Top	1	55.00	Lubricant	Liquid		Fair	0	55-GALLON DRUM WITH DRIP PAN.
CC-2200-0587	435	A	1 Gallon Can	0	1.00	Unknown	Liquid		Fair	0	

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CC-2009-0587	435	B	Fiberboard	1	7.35	Unknown	Solid		Fair	0	SODIUM FLUORIDE. 55-GALLON. REACTIVE MATERIAL.
CC-2009-0587	435	B	Fiberboard	20	147.00	Unknown	Solid	White	Fair	0	(2009A) HOUGHTON'S LIQUID HEAT. 55-GALLON DRUMS. POWDER WITH CRYSTALS. FLASHPOINT > 74C.
CC-2009-0587	435	B	Fiberboard	20	147.00	Unknown	Solid	Orange	Fair	0	(2009B) BETZ WATER CONDITIONER. CONTAINS SOLUABLE CHROMATE SALTS. FLASHPOINT > 110C.
CC-2009-0587	435	B	Fiberboard	9	66.00	Unknown	Solid	Brown	Fair	0	(2009C) POLYPHASE FIRESIDE CHEMICAL (RX613). FLASHPOINT > 110C.
CC-2010-0587	435	B	Drum: Open Top	2	14.70	Unknown	Solid	Blue	Fair	0	55-GALLON CRYSTALLINE POWDER. FLASHPOINT > 110C.
CC-2010-0587	435	B	Drum: Open Top	1	4.00	Unknown	Solid		Fair	0	50-POUNDS OF MET-L-X POWDER.
CC-2010-0587	435	B	Drum: Open Top	23	169.00	Unknown	Solid		Fair	0	55-GALLON DRUMS.
CC-2011-0587	435	B	Bag	29	29.00	Base	Solid		Poor	0	70 POUND BAG OF LIGHT SODA ASH.
CC-2011-0587	435	B	Bag	25	25.00	Unknown	Solid	White	Fair	0	(2011B) 70-POUND BAGS OF PARAFORMALDEHYDE FLAKE. MADE BY CELANESE. FLASHPOINT = 80C.
CC-2011-0587	435	B	Bag	500	500.00	Unknown	Solid		Fair	0	(2011A) 100-POUND BAGS OF KENITE. FLASHPOINT > 110C.
CC-2011-0587	435	B	Bag	3	3.00	Unknown	Solid	White	Fair	0	(2011C) HYFLO-SUPERCEL. DIATOMACEOUS SILICA PRODUCT FROM JOHNS MANVILLE. FLASHPOINT > 110C.
CC-2012-0587	435	E	Other	9	0.00				Fair	0	EMPTY CRYOGENIC CONTAINERS.
CC-2101-0587	435	E	Other	9	0.00	Empty				0	EMPTY CRYOGENIC CONTAINERS.

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CC-2017-0587	435	E/O	Other	3	0.00	Unknown	Liquid		Good	0	REACTION VESSELS, 2 EMPTY, 1 SEALED.
CC-2013-0587	435	F	1 Gallon Can	1	1.00	Paint	Solid	White	Fair	0	PAINT CAN OF POWDER.
CC-2013-0587	435	F	Other	1	0.00	Empty				0	EMPTY 10-GALLON CONTAINER.
CC-2014-0587	435	G	Gas Cylinder	7	0.00	Gas	Gas		Fair	0	4 1/2" GAS CYLINDERS.
CC-2015-0587	435	G	Other	2	10.00	Solvent	Liquid		Fair	0	10-GALLON CONTAINERS OF KEROSENE.
CC-2016-0587	435	G	Other	1	0.00	Trash	Solid		Fair	0	30-GALLON TRASH CAN FILL WITH EMPTY BOTTLES.
CC-2001-0587	435	N	Other	1	1.34	Trash	Solid			0	10-GALLON DRUM CONTAINING SMALL AMOUNT OF TRASH.
CC-2019-0587	435	W/O	Other	1	0.00	Empty				0	EMPTY CYROGENIC CONTAINERS.
CC-2020-0587	435	W/O	Drum: Bung Top	5	200.00	Lubricant	Liquid	Brown	Poor	0	55-GALLON DRUMS, OVER-PRESSURIZED, LEAKING AND OILY AROUND DRUM RIM. APPEARS TO BE LUBRICANT. FLASHPOINT > 110C.
CC-2021-0587	435	W/O	Drum: Open Top	3	0.00	Empty			Poor	0	55-GALLON DRUMS, TOP RUSTED OFF.
CC-2022-0587	435	W/O	Drum: Bung Top	4	200.00	Unknown	Liquid	Blue	Fair	100	RUSTED. DRUM SAMPLED WAS 3/4 FULL. FLASHPOINT > 110C.
CC-2023-0587	435	W/O	Drum: Bung Top	1	0.00	Empty				0	MODIFIED, 55-GALLON DRUM. RADIOACTIVE.
CC-2024-0587	435	W/O	Drum: Bung Top	2	60.00	Solvent	Liquid	Brown	Poor	11	55-GALLON, MULTI-RIBBED AND RUSTED. FLASHPOINT = 24C.
CC-2033-0587	436	A	1 Gallon Can	3	0.40	Empty				0	

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CC-2033-0587	436	A	Bottle	1	0.50	Acid	Liquid		Good	0	1/2 GALLON BOTTLE OF SULFURIC ACID.
CC-2033-0587	436	A	Other	5	1.00	Mixture	Liquid		Poor	0	ASSORTED BOTTLES, CANS, BUCKETS.
CC-2034-0587	436	C	5 Gallon Can	2	5.00	Tar	Liquid		Fair	0	PROTECTIVE COATING.
CC-2034-0587	436	C	1 Gallon Can	2	0.27	Empty			Fair	0	
CC-2034-0587	436	C	Jar	8	1.00	Solvent	Liquid		Poor	0	POSSIBLY GLUE.
CC-2034-0587	436	C	Bottle	1	1.00	Lubricant	Liquid		Fair	0	TRANSMISSION FLUID.
CC-2034-0587	436	C	Bottle	1	0.50	Solvent	Liquid		Fair	0	TURPENTINE.
CC-2025-0587	436	E/O	Other	1	0.00					0	TRANSFORMER.
CC-2026-0587	436	E/O	Other	0	0.00	Empty			Poor	0	EMPTY AND BROKEN GLASS CARBOYS.
CC-2027-0587	436	E/O	Drum: Open Top	19	100.00	Unknown	Liquid	Yellow	Fair	7	RADIOACTIVE, 12 APPEAR TO BE OVERPACK WITH STAINLESS STEEL CASKS IN THEM. BETA = 6,000 & 1100 CPM. GAMMA = 265K & 3K. KEG SAMPLED WAS 2/3 FULL.
CC-2028-0587	436	E/O	Other	7	0.00	Empty			Fair	0	EMPTY CYROGENIC CONTAINERS.
CC-2032-0587	436	N/O	Other	13	0.00	Battery	Solid		Fair	0	FORKLIFT BATTERY PACKS.
CC-2029-0587	436	W/O	Drum: Open Top	2	5.00	Unknown	Solid		Poor	0	55-GALLON DRUMS OF SOIL MATERIAL.
CC-2029-0587	436	W/O	Drum: Bung Top	2	5.00	Unknown	Solid		Poor	0	55-GALLON DRUMS WITH SANDY SOIL MATERIAL.
CC-2030-0587	436	W/O	Drum: Open Top	40	294.00	Unknown	Solid		Poor	0	DRUMS FILLED WITH 2" X 2" MAGNESIUM INGOTS. SEVERAL DRUMS NEAREST THE BUILDING CONTAIN TAR-LIKE MATERIAL.

APPENDIX 1
Weldon Spring Site Remedial Action Project
Chemical Plant Containerized Chemical Inventory
May 1987

CONTAINER I.D. #	BUILDING #	ROOM #	CONTAINER TYPE	NUMBER	VOLUME EST. (ft3 OR GAL.)	FUNCTIONAL GROUP	PHASE	COLOR	INTEGRITY	PID READINGS	COMMENTS
CC-2041-0587	436	W/O	Drum: Open Top	18	20.00	Water	Liquid	Clear	Poor	0	MANY DRUMS RUSTED THROUGH. ALL DRUMS EMPTY EXCEPT FOR ONE. ONE DRUM APPEARS TO CONTAIN RAINWATER. FLASHPOINT (2041A & 2041AA) > 110C.
CC-2042-0587	436	W/O	Tank	2	0.00	Empty				0	OPENED WITH SURFACE RUST.
CC-2043-0587	436	W/O	Drum: Open Top	2	55.00	Unknown	Liquid		Fair	0	55-GALLON.
CC-2044-0587	436	W/O	Drum: Open Top	1	7.35	Empty			Fair	0	EMPTY 55-GALLON.
CC-2045-0587	436	W/O	Drum: Open Top	1	0.00	Empty			Poor	0	OPEN, RUSTED 55-GALLON DRUM.
CC-2046-0587	436	W/O	Drum: Bung Top	9	110.00	Unknown	Liquid		Fair	0	7 EMPTY, 2 FULL 55-GALLON DRUMS. 1 SAMPLED AND FOUND TO BE RADIOACTIVE.
CC-2047-0587	436	W/O	5 Gallon Can	1	0.67	Paint	Solid		Fair	0	PRESSURIZED CAN. SURFACE RUST.
CC-2031-0587	437	A	Bottle	1	1.00	Acid	Liquid		Good	0	GALLON OF NITRIC ACID.
CC-2035-0587	438	A	Drum: Bung Top	15	80.20	Unknown	Solid	White	Fair	0	40-GALLON DRUMS WITH SURFACE RUST. FINE POWDER. FLASHPOINT > 110C.
CC-2035-0587	438	A	5 Gallon Can	4	2.67	Tar	Solid		Poor	0	"PROTECTITE". LID RUSTED THROUGH.
CC-2036-0587	438	A	5 Gallon Can	4	20.00	Tar	Liquid		Poor	0	CANS LABELED "PROTEKTITE". MANUFACTURED BY THE STOVEY COMPANY.
CC-2038-0587	438	A	Fiberboard	2	12.00	Unknown	Solid		Fair	0	SODIUM FLUORIDE.
CC-2039-0587	438	A	Fiberboard	2	12.00	Unknown	Solid	Brown	Poor	0	RED-BROWN SOLID, CONTAINER RUPTURED. FLASHPOINT > 110C.
CC-2040-0587	438	A	1 Gallon Can	2	2.00	Paint	Liquid		Fair	0	PAINT CONTAINERS.

APPENDIX I
Weldon Spring Site Remedial Action Project
Chemical Plant Containerized Chemical Inventory
May 1987

CONTAINER I.D. #	BUILDING #	ROOM #	CONTAINER TYPE	NUMBER	VOLUME EST. (ft3 OR GAL.)	FUNCTIONAL GROUP	PHASE	COLOR	INTEGRITY	PID READINGS	COMMENTS
CC-2040-0587	438	A	Other	18	2.00	Paint	Liquid		Fair	0	1QT PAINT CONTAINERS.
CC-2040-0587	438	A	1 Gallon Can	3	1.00	Solvent	Liquid		Fair	0	SOLVENTS.
CC-2173-0587	441		Gas Cylinder	13	0.00	Gas	Gas		Poor	0	LABELED NITROGEN. 4.5'H RUSTED BOTTOMS.
CC-2180-0587	443	O	Drum: Open Top	5	0.00	Empty			Fair	0	EMPTY AND RUSTED DRUMS: 2 55-GALLON, 3 40-GALLON.

ATTACHMENT 2

APPENDIX II
Weldon Spring Site Remedial Action Project
Chemical Plant Fire Extinguisher Inventory
May 1987

BUILDING	FLOOR	ROOM	TYPE	WEIGHT	NUMBER
101	1ST		Dry Chemical, Red (AB or ABC)	15	4
101	1ST		Dry Chemical, Yellow (for metal fires)	15	1
101	1ST		Carbon Dioxide	15	3
101	2ND		Carbon Dioxide	15	2
101	2ND	A	Carbon Dioxide	15	1
101	2ND	B	Carbon Dioxide	15	2
101	2ND	C	Carbon Dioxide	15	4
101	3RD		Carbon Dioxide	15	6
101	4TH		Carbon Dioxide	15	4
101	5TH		Carbon Dioxide	15	1
101	6TH		Carbon Dioxide	15	1
103		B	Dry Chemical, Red (AB or ABC)	15	15
103		B	Dry Chemical, Yellow (for metal fires)	15	18
103		B	Carbon Dioxide	5	3
103		B	Carbon Dioxide	15	43
103		B	Carbon Dioxide	150	1
103		WEST	Carbon Dioxide	10	1
103	TOP	EAST	Carbon Dioxide	15	1
103	WEST STAIRS		Carbon Dioxide	15	1
105		SOUTH OUTSIDE	Dry Chemical, Red (AB or ABC)	15	1
106		A	Carbon Dioxide	15	1
108		EAST OUTSIDE	Carbon Dioxide	10	3

APPENDIX II
Weldon Spring Site Remedial Action Project
Chemical Plant Fire Extinguisher Inventory
May 1987

BUILDING	FLOOR	ROOM	TYPE	WEIGHT	NUMBER
109			Dry Chemical, Yellow (for metal fires)	15	6
109			Carbon Dioxide	15	52
109			Propellant Cartridge, Ansul	15	2
201	1ST		Dry Chemical, Yellow (for metal fires)	15	1
201	1ST		Carbon Dioxide	15	19
201	2ND		Dry Chemical, Yellow (for metal fires)	20	1
201	2ND		Carbon Dioxide	15	5
201	3RD		Dry Chemical, Yellow (for metal fires)	20	1
201	3RD		Carbon Dioxide	15	3
201	4TH		Carbon Dioxide	15	6
201	5TH		Carbon Dioxide	15	2
201	6TH		Carbon Dioxide	15	3
301		B	Dry Chemical, Yellow (for metal fires)	15	1
301	2ND		Carbon Dioxide	15	2
301	ROOF		Carbon Dioxide	15	2
401		FEEDER HOUSE	Carbon Dioxide	15	1
401	1ST		Carbon Dioxide	15	4
401	3RD		Carbon Dioxide	15	1
401	4TH		Carbon Dioxide	15	3
403		EAST OUTSIDE	Carbon Dioxide	150	2
403		ROOM 3, SOUTH	Dry Chemical, Red (AB or ABC)	30	3
403		ROOM E, SOUTH	Carbon Dioxide	10	2

APPENDIX II
Weldon Spring Site Remedial Action Project
Chemical Plant Fire Extinguisher Inventory
May 1987

BUILDING	FLOOR	ROOM	TYPE	WEIGHT	NUMBER
403	1ST	B	Carbon Dioxide	15	1
403	1ST	C	Carbon Dioxide	20	2
403	1ST	D	Carbon Dioxide	15	4
403	1ST	ROOM F	Dry Chemical, Red (AB or ABC)	30	4
403	2 1/2		Carbon Dioxide	15	1
403	2ND		Carbon Dioxide	15	4
403	2ND	SOUTH	Dry Chemical, Red (AB or ABC)	30	3
403	3RD	SOUTH	Dry Chemical, Red (AB or ABC)	30	3
403	OUTDOORS, 2 & 3		Other	20	4
404		A	Dry Chemical, Yellow (for metal fires)	15	1
404		A	Carbon Dioxide	15	1
404		A	Other	15	2
404		A	Dry Chemical, Red (AB or ABC)	10	1
404		A	Other		4
404		A	Dry Chemical, Red (AB or ABC)	15	1
404		A	Dry Chemical, Yellow (for metal fires)	15	1
404		A	Other		1
404		A	Dry Chemical, Yellow (for metal fires)	15	2
404		A	Dry Chemical, Yellow (for metal fires)	15	2
404		A, W. CENTRAL AREA	Dry Chemical, Red (AB or ABC)	15	1
404		A, W. CENTRAL AREA	Dry Chemical, Yellow (for metal fires)	15	2
404		WEST	Dry Chemical, Yellow (for metal fires)	150	1
404	2ND	NORTH	Dry Chemical, Yellow (for metal fires)	15	3
404	2ND	NORTH	Other	15	1
404	2ND	WEST	Dry Chemical, Red (AB or ABC)	15	1

APPENDIX II
Weldon Spring Site Remedial Action Project
Chemical Plant Fire Extinguisher Inventory
May 1987

BUILDING	FLOOR	ROOM	TYPE	WEIGHT	NUMBER
404	2ND	WEST	Dry Chemical, Yellow (for metal fires)	15	3
405		A	Dry Chemical, Red (AB or ABC)	15	2
405		A	Dry Chemical, Yellow (for metal fires)	15	2
405		NORTH	Other	151	2
406		A	Dry Chemical, Red (AB or ABC)	350	1
406		A	Carbon Dioxide	15	4
407A		51	Dry Chemical, Yellow (for metal fires)	20	1
407A	ROOF	EAST	Carbon Dioxide	15	3
407A	ROOF	WEST	Carbon Dioxide	15	1
407B		68	Carbon Dioxide	20	1
407B		75	Carbon Dioxide	15	1
407C		103	Carbon Dioxide	15	1
408A		A	Carbon Dioxide	5	1
408A		B	Carbon Dioxide	15	3
408A		E	Carbon Dioxide	15	1
408A		H	Carbon Dioxide	15	1
408C		R	Carbon Dioxide	15	2
409		N.E. HALLWAY	Carbon Dioxide	15	9
410		F	Carbon Dioxide	5	5
410		F	Propellant Cartridge, Ansul		33

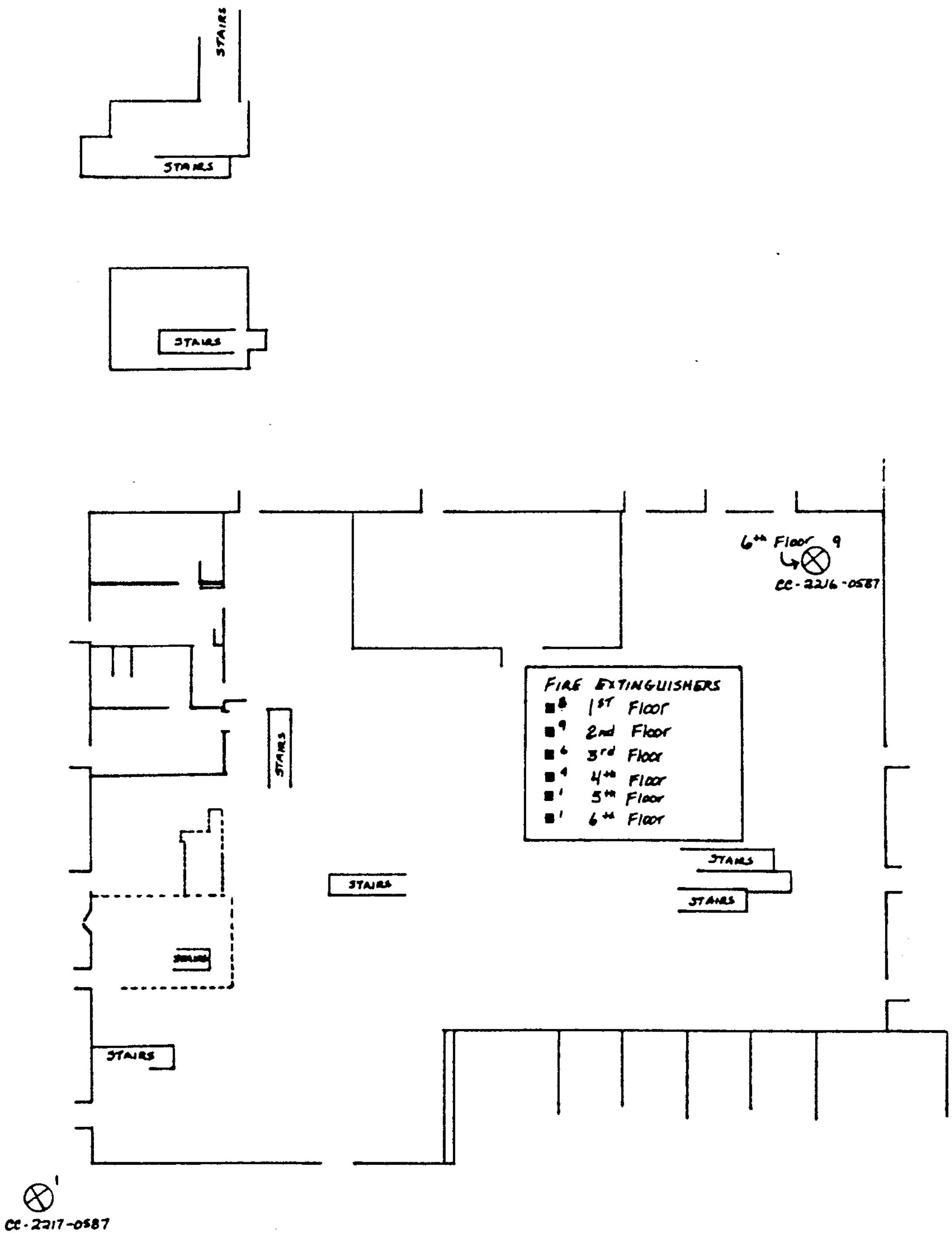
APPENDIX II
Weldon Spring Site Remedial Action Project
Chemical Plant Fire Extinguisher Inventory
May 1987

BUILDING	FLOOR	ROOM	TYPE	WEIGHT	NUMBER
410		O	Carbon Dioxide	15	1
410		R	Carbon Dioxide	5	1
410		T	Carbon Dioxide	20	1
412		A	Carbon Dioxide	15	1
412		SOUTH OUTSIDE	Carbon Dioxide	15	1
413		A	Carbon Dioxide	15	1
413		SOUTH COOLING TOWERS	Carbon Dioxide	15	1
414		A	Dry Chemical, Red (AB or ABC)	15	1
414		A	Carbon Dioxide	15	1
414		NORTH OUTSIDE	Carbon Dioxide	15	1
417		A	Carbon Dioxide	15	2
417		B	Carbon Dioxide	15	1
417		B	Carbon Dioxide	20	1
417		C	Dry Chemical, Yellow (for metal fires)	350	1
417		C	Carbon Dioxide	15	1
417		EAST OUTSIDE	Carbon Dioxide		1
417		NORTH OUTSIDE	Carbon Dioxide	15	1
417		SOUTH OUTSIDE	Dry Chemical, Yellow (for metal fires)		3
417		SOUTH OUTSIDE	Carbon Dioxide	15	6
417		SOUTH OUTSIDE	Carbon Dioxide	40	1
433		A	Carbon Dioxide	15	3

APPENDIX II
Weldon Spring Site Remedial Action Project
Chemical Plant Fire Extinguisher Inventory
May 1987

BUILDING	FLOOR	ROOM	TYPE	WEIGHT	NUMBER
433		B	Carbon Dioxide	20	1
433		D	Carbon Dioxide	15	3
433		E	Dry Chemical, Yellow (for metal fires)	15	1
433		F	Carbon Dioxide	15	1
434		A	Dry Chemical, Red (AB or ABC)	10	1
435		A	Dry Chemical, Yellow (for metal fires)	4	1
435		A	Carbon Dioxide	10	1
435		G	Dry Chemical, Red (AB or ABC)	350	2
435		G	Carbon Dioxide	5	1
435		G	Carbon Dioxide	10	8
435		G	Carbon Dioxide	15	63
435		G	Carbon Dioxide	20	3
435		G	Propellent Cartridge, Other		8
436		A	Carbon Dioxide	10	1
436		A	Carbon Dioxide	15	1
437		B	Carbon Dioxide	10	1
437		B	Carbon Dioxide	15	2
438		A	Carbon Dioxide	15	1
443			Dry Chemical, Red (AB or ABC)	15	19
443			Dry Chemical, Yellow (for metal fires)	15	3

ATTACHMENT 3



KEY

⊗9 CC-2216-0587 Container Location Quantity and Number

■8 Fire Extinguisher Location and Quantity

JE JACOBS ENGINEERING GROUP INC.
[illegible] WEST COLFAX AVE, A200, LAKEWOOD, COLORADO [illegible]
TELEPHONE (303) 232-7098

TITLE: BLDG 101A FEED PREP and SAMPLING PLANT

PROJECT NAME: WELDON SPRING

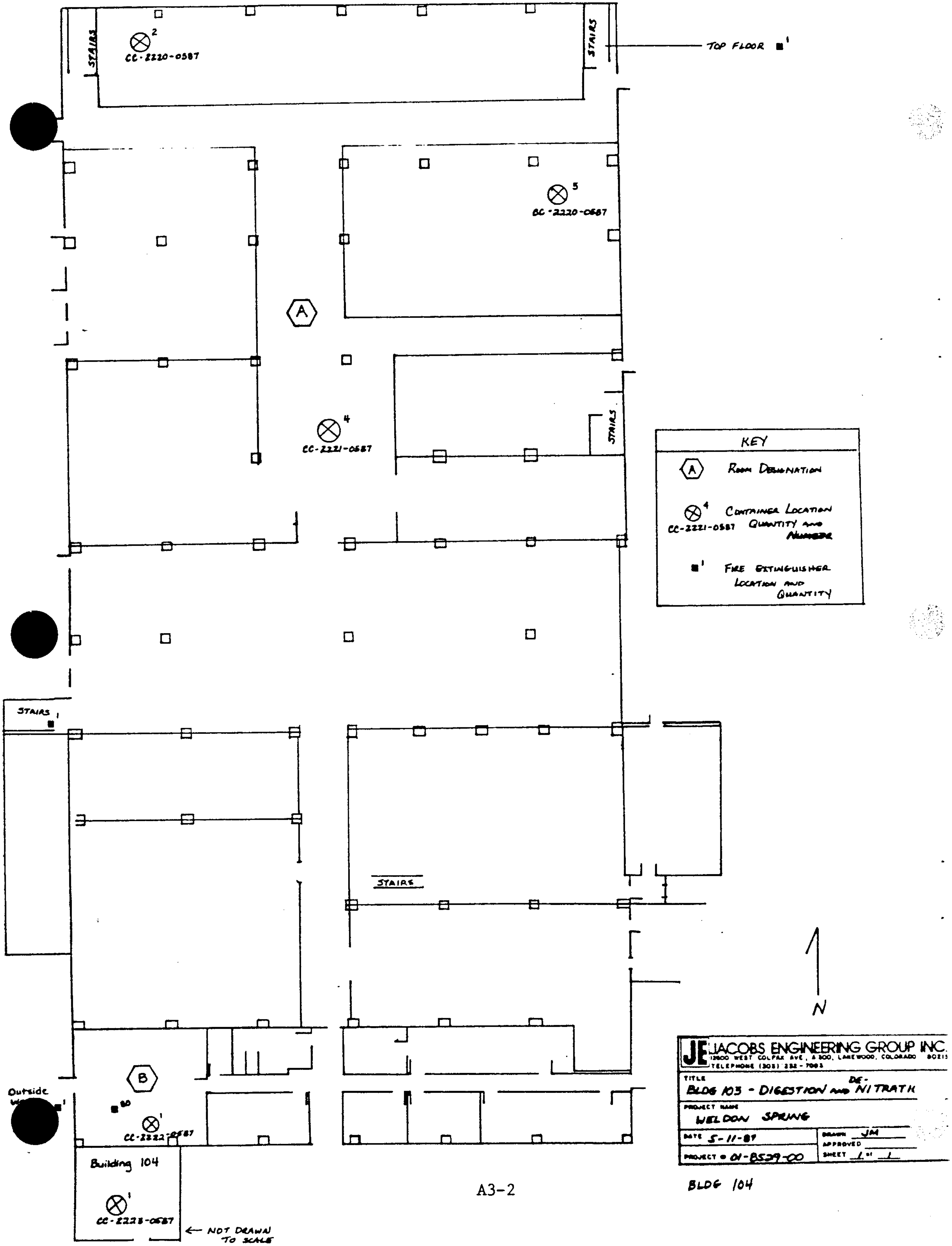
DATE: 5-12-87

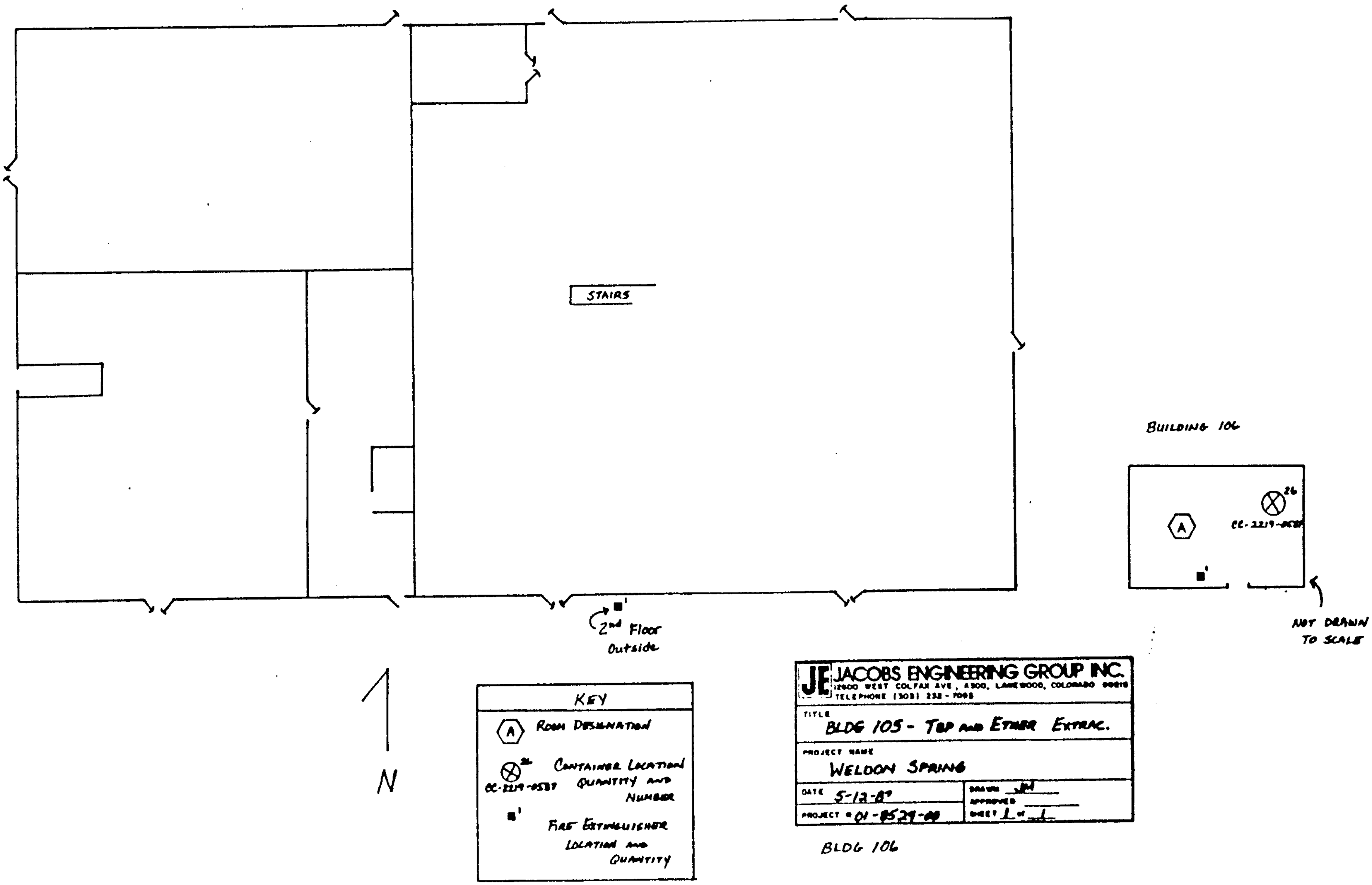
PROJECT #: 01-8529-00

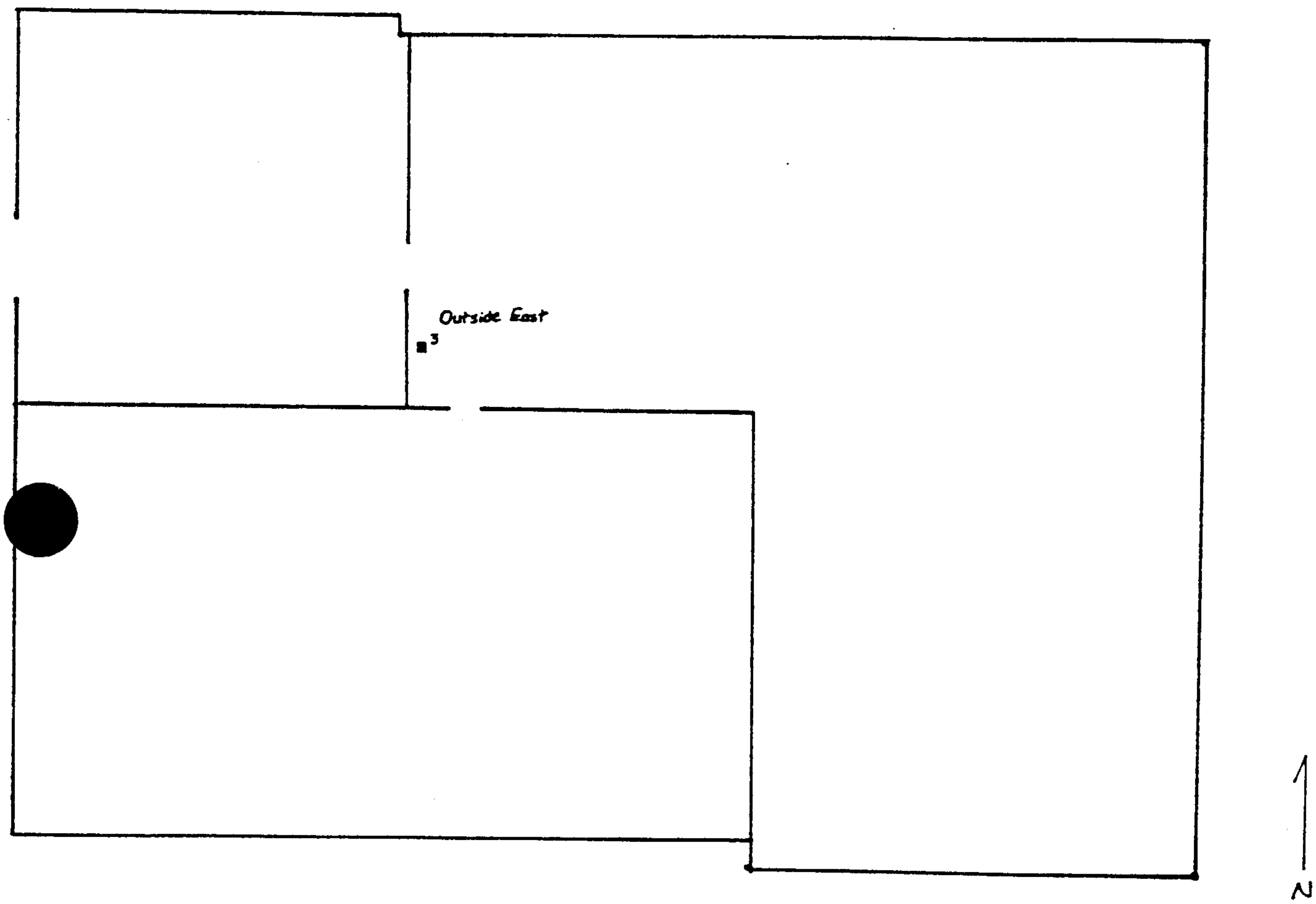
DRAWN: [illegible]

APPROVED:

SHEET 1 of 2


STAIRS
CC-2220-0587
STAIRS
TOP FLOOR
BC-2220-0587
CC-2221-0587
STAIRS
KEY
Room Designation
Container Location Quantity and Number
CC-2221-0587
Fire Extinguisher Location and Quantity
STAIRS
STAIRS
N
Outside
CC-2222-0587
Building 104
CC-2223-0587
← NOT DRAWN TO SCALE
JACOBS ENGINEERING GROUP INC.
TITLE
BLDG 103 - DIGESTION AND DE-NITRATI
PROJECT NAME
WELDON SPRING
DATE 5-11-89
DRAWN JM
APPROVED
SHEET 1 OF 1
PROJECT # 01-B529-00
BLDG 104


STAIRS
2nd Floor Outside
BUILDING 106
A
CC-2219-0587
NOT DRAWN TO SCALE
N
KEY
A Room Designation
CC-2219-0587 Container Location Quantity and Number
Fire Extinguisher Location and Quantity
JE JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7093
TITLE BLDG 105 - TBP and Ether Extrac.
PROJECT NAME WELDON SPRING
DATE 5-12-89
PROJECT # 01-8529-00
DRAWN JH
APPROVED
SHEET 1 of 1
BLDG 106



KEY

■3 Fire Extinguisher Location and Quantity

JACOBS ENGINEERING GROUP INC.

TITLE BLDG 108 Nitric Acid

PROJECT NAME WELDON SPRING

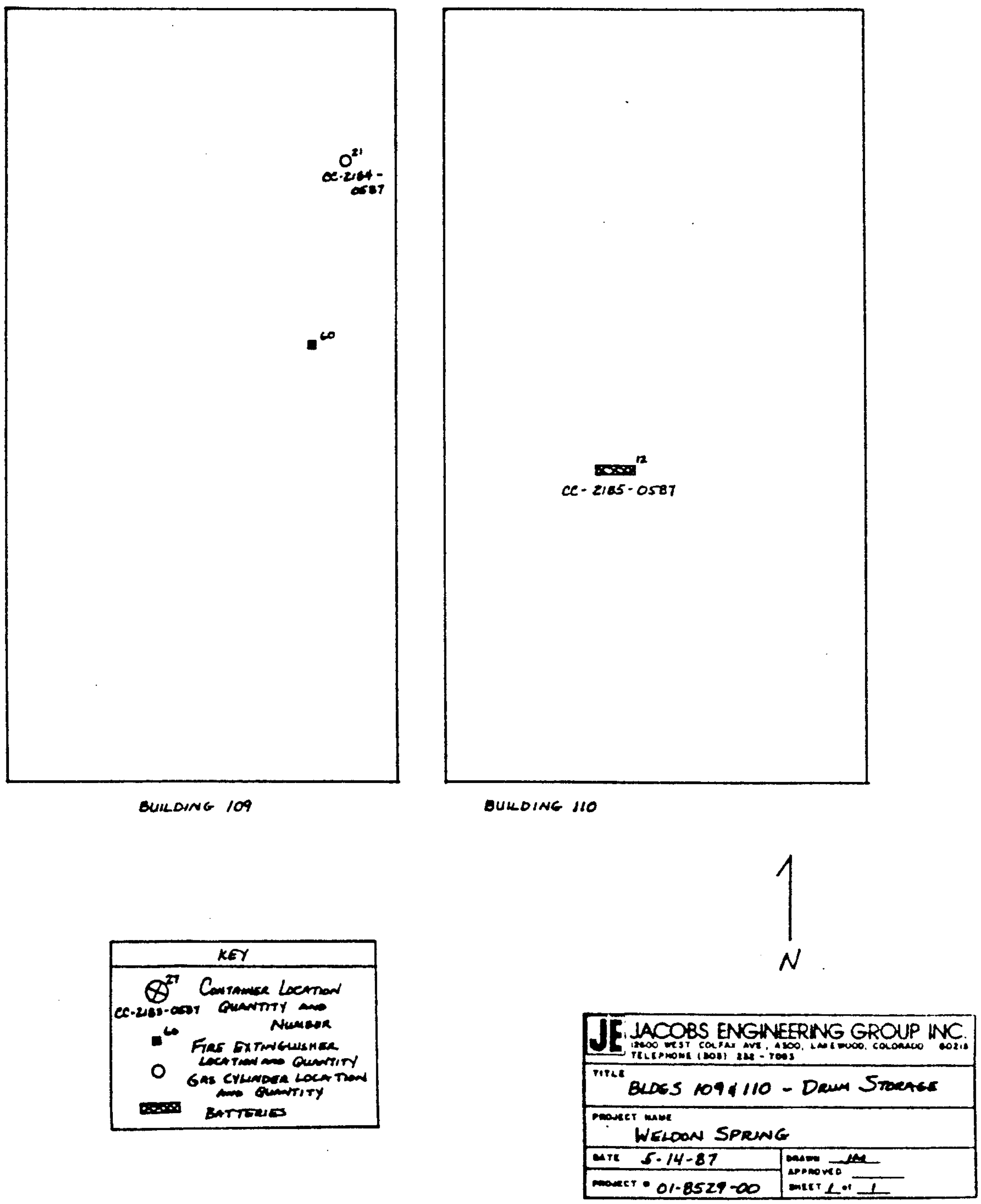
DATE 8/12/87

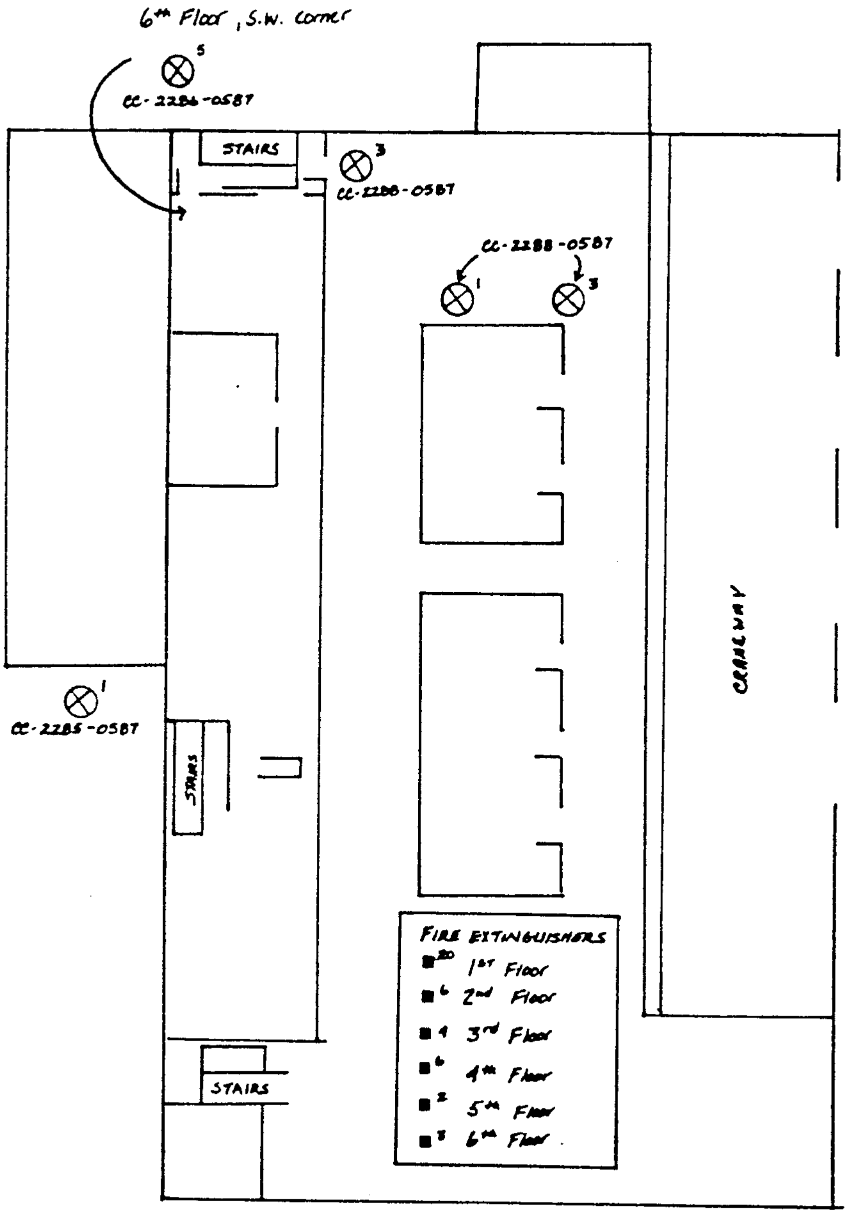
PROJECT # [illegible]-8529-00

DRAWN [illegible]

APPROVED

SHEET 1 of 1


21
CC-2184-0587
60
12
CC-2185-0587
BUILDING 109
BUILDING 110
N
KEY
21
CC-2183-0587
CONTAINER LOCATION QUANTITY AND NUMBER
60
FIRE EXTINGUISHER LOCATION AND QUANTITY
GAS CYLINDER LOCATION AND QUANTITY
BATTERIES
JE JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7063
TITLE
BLDGS 109 & 110 - DRUM STORAGE
PROJECT NAME
WELDON SPRING
DATE 5-14-87
DRAWN JM
APPROVED
PROJECT # 01-8529-00
SHEET 1 OF 1



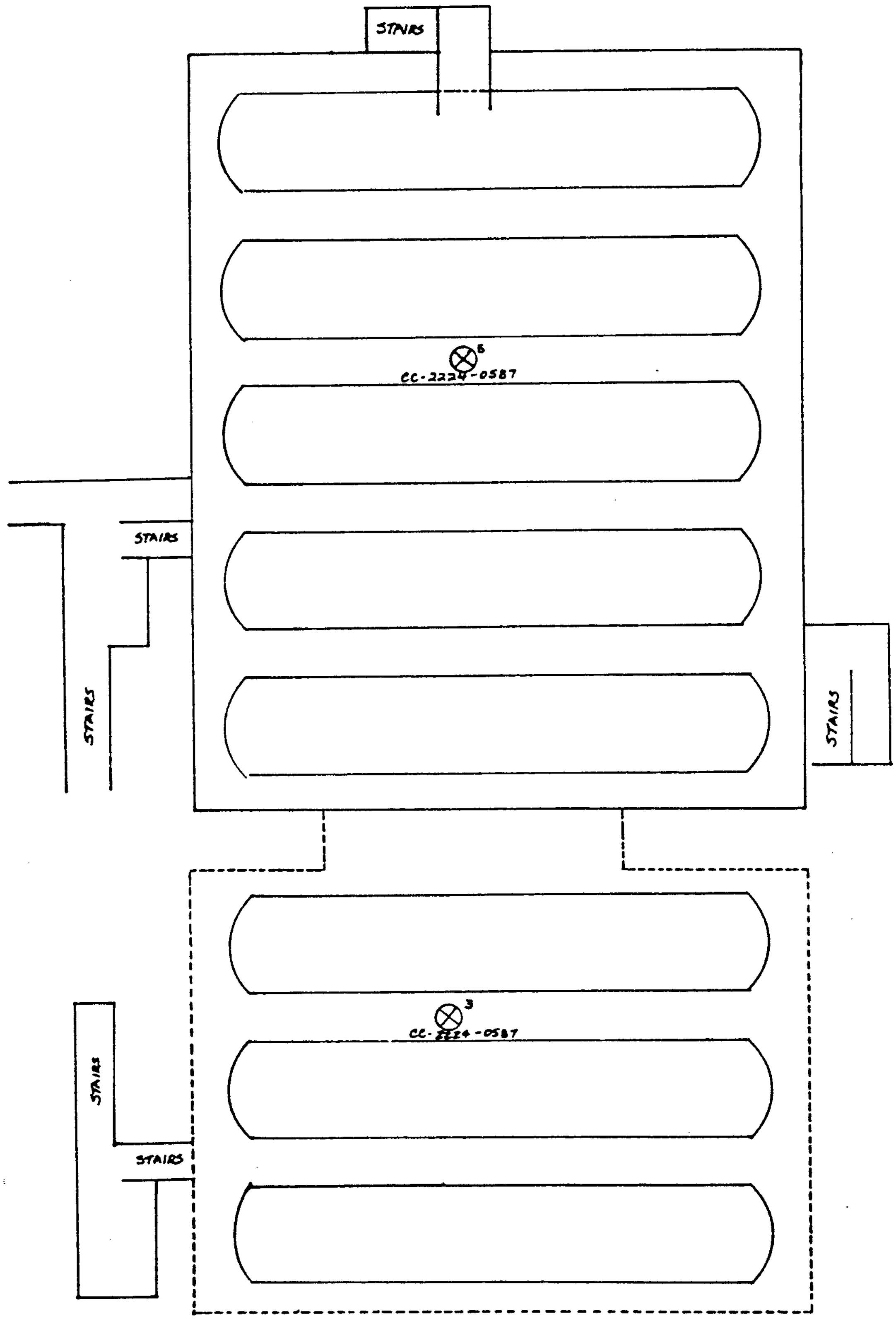
KEY

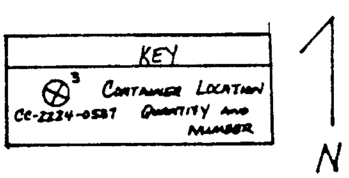
⊗ 1 CC-2285-0587 Container Location Quantity And Number

■ 3 Fire Extinguisher Location and Quantity

N

JE JACOBS ENGINEERING GROUP INC. 2600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215 TELEPHONE (303) 232-7083	
TITLE BLDG 201 - GREEN SALT PLANT	
PROJECT NAME WELDON SPRING	
DATE 5-12-87	DRAWN JM
	APPROVED
PROJECT # 01-8529-00	SHEET





JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 238-7088

TITLE BLDG 202 - GREEN SALT TANK FARM

PROJECT NAME WELDON SPRING

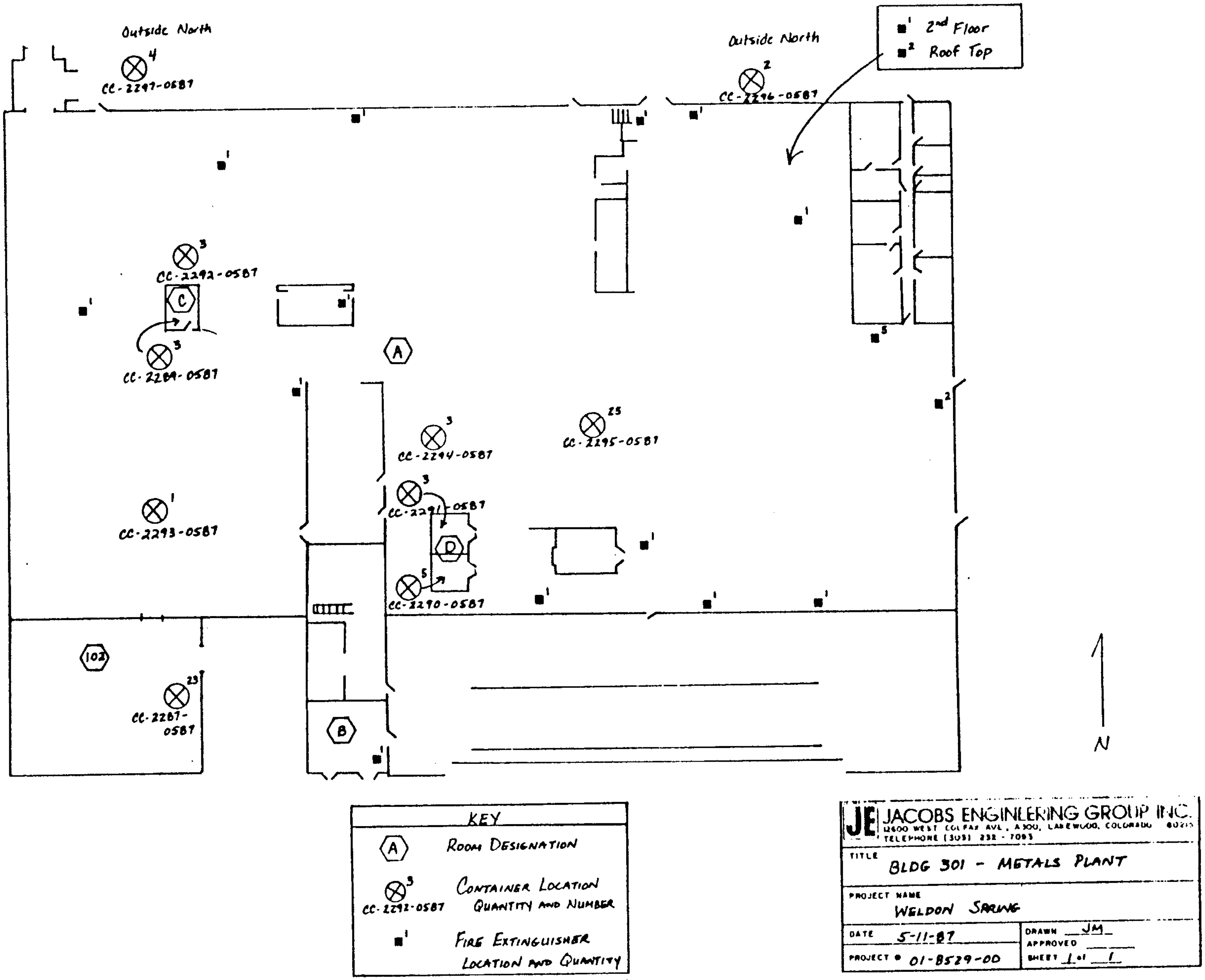
DATE 5-12-87

PROJECT # 01-8529-00

DRAWN JM

APPROVED

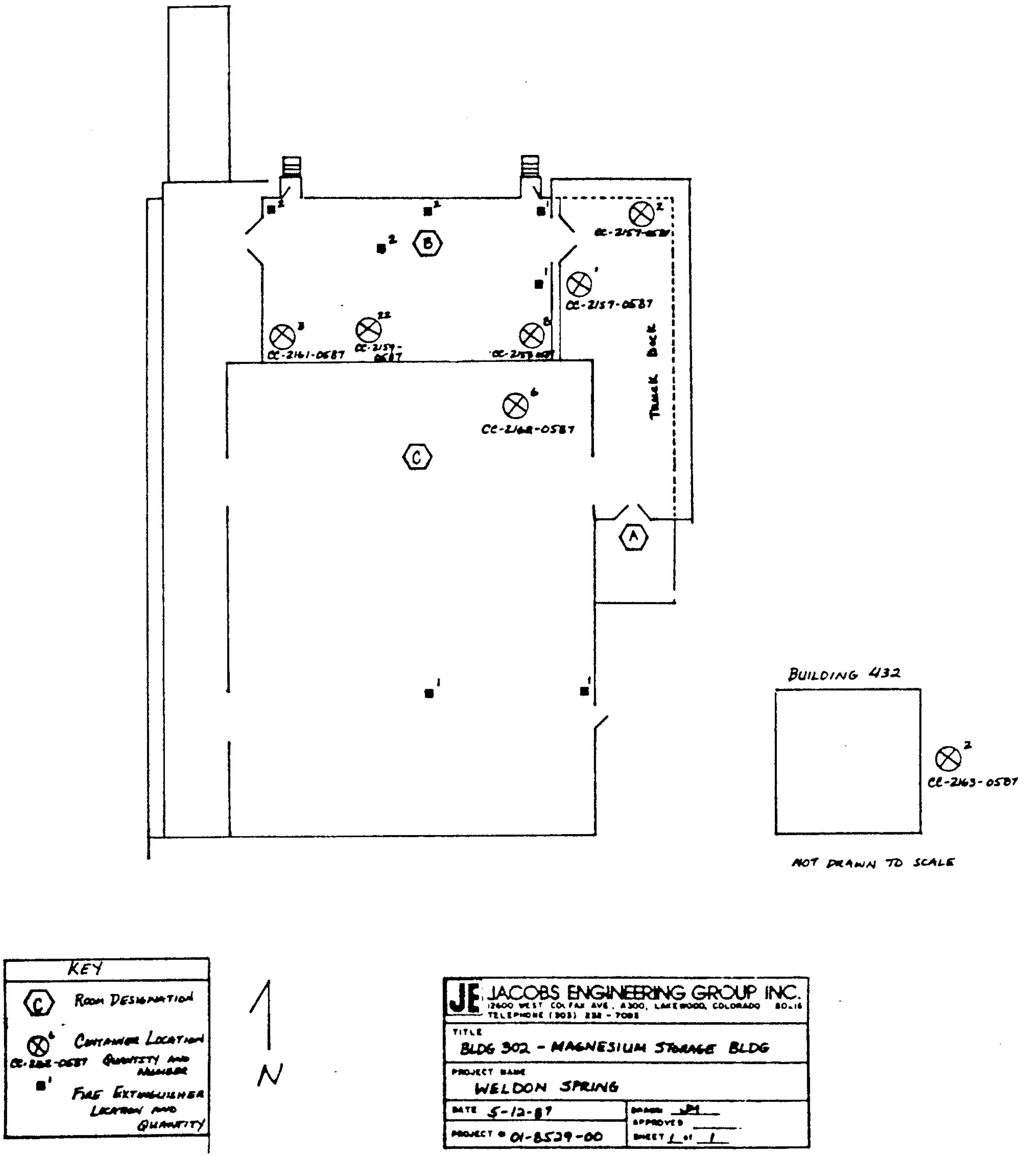
SHEET 1 OF 1


Outside North
CC-2297-0587
Outside North
CC-2296-0587
2nd Floor
Roof Top
CC-2292-0587
CC-2289-0587
CC-2294-0587
CC-2295-0587
CC-2291-0587
CC-2290-0587
CC-2293-0587
CC-2287-0587
A
B
C
D
102
N
KEY
Room Designation
Container Location Quantity and Number
Fire Extinguisher Location and Quantity
JE JACOBS ENGINEERING GROUP INC.
TITLE BLDG 301 - METALS PLANT
PROJECT NAME WELDON SPRING
DATE 5-11-87
DRAWN JM
APPROVED
PROJECT # 01-8529-00
SHEET 1 of 1

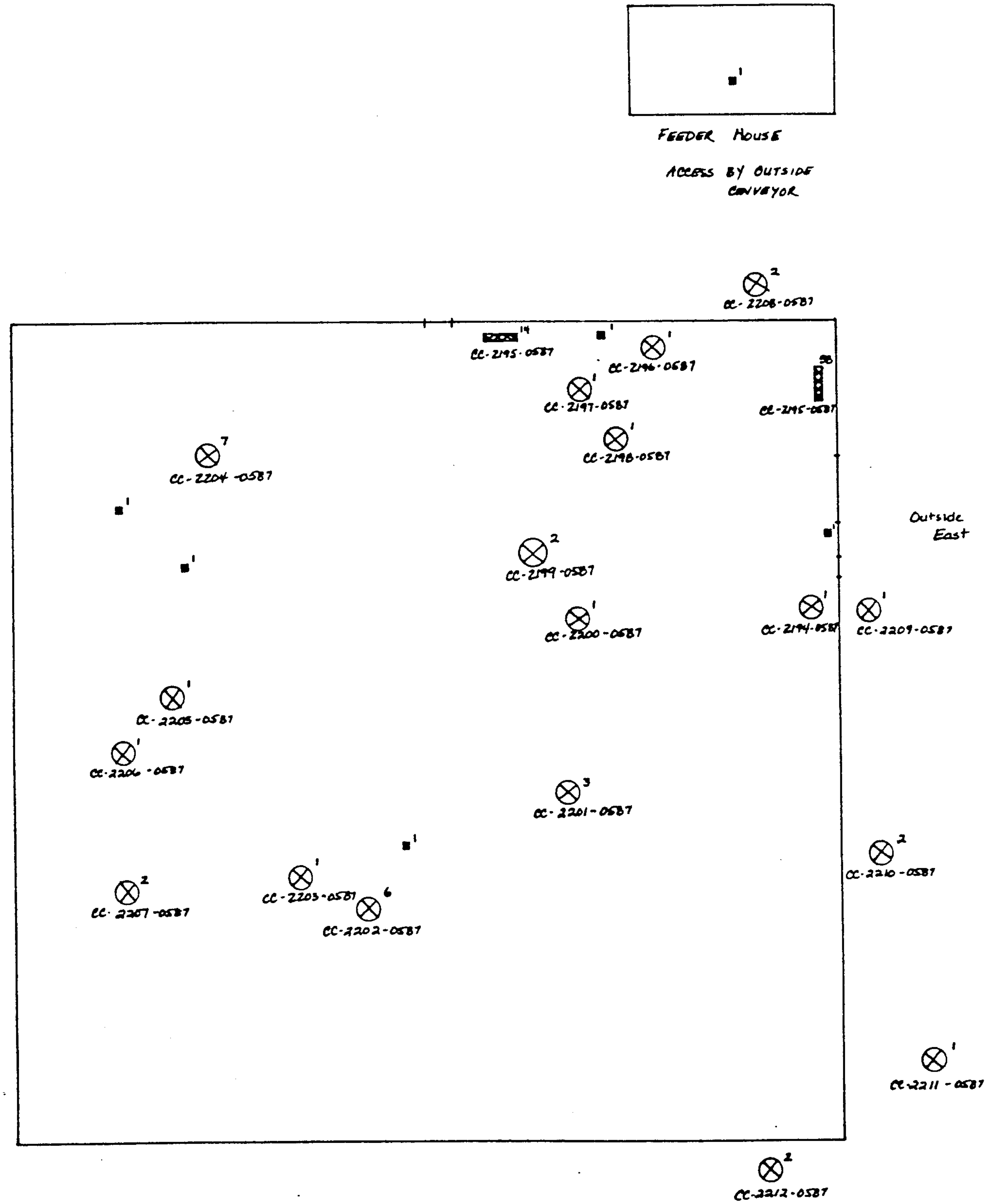
Approximate Dimensions (ft) of Cocoons Located in Building 301

	Length		Width		Height
1.	87	X	9	X	4 1/2
2.	13	X	4	X	3
3.	25	X	21	X	9
4.	16	X	13	X	9
5.	34	X	45	X	12
6.	18	X	7	X	12
7.	16	X	17	X	3
8.	21	X	13	X	5
9.	33	X	15	X	18
10.	17	X	15	X	18
11.	18	X	15	X	18
12.	15	X	8	X	12
13.	7	X	7	X	6
14.					
15.	6	X	4	X	7
16.	12′	X	12′	X	6"
17.	12′	X	12′	X	6"
18.	12′	X	12′	X	6"
19.	12′	X	12′	X	6"
20.	23	X	7	X	6
21.	48	X	11	X	9
22.	48	X	10	X	9
23.	26	X	13	X	5
24	26	X	14	X	6

	Length		Width		Height
25.	6	X	3	X	6"
26.	7	X	5	X	2
27.	9	X	3	X	8
28.	85	X	38	X	10
29.	25	X	30	X	10
30.	15	X	15	X	10
31.	15	X	15	X	7
32.	13	X	6	X	5
33.	9	X	7	X	9
34.	12	X	7	X	10



CC-2157-0587
CC-2161-0587
CC-2162-0587
Truck Dock
BUILDING 432
CC-2163-0587
NOT DRAWN TO SCALE
KEY
Room Designation
Container Location Quantity and Number
Fire Extinguisher Location and Quantity
N
JE JACOBS ENGINEERING GROUP INC.
TITLE
BLDG 302 - MAGNESIUM STORAGE BLDG
PROJECT NAME
WELDON SPRING
DATE 5-12-87
PROJECT # 01-8529-00
SHEET 1 of 1



KEY

CC-2205-0587 — CONTAINER LOCATION QUANTITY AND NUMBER

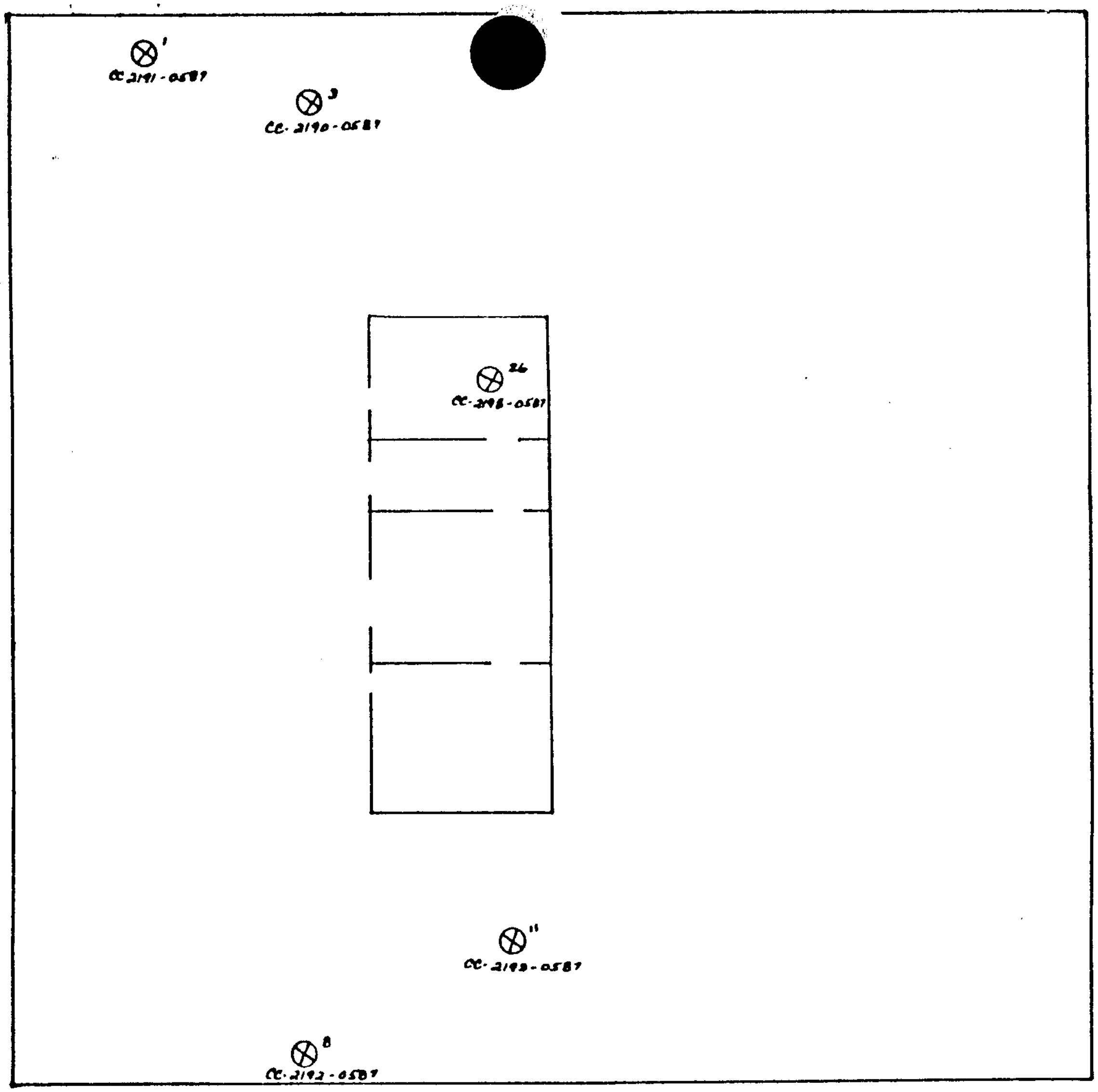
■ — FIRE EXTINGUISHER LOCATION AND QUANTITY

BATTERIES

N

JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 238-7005

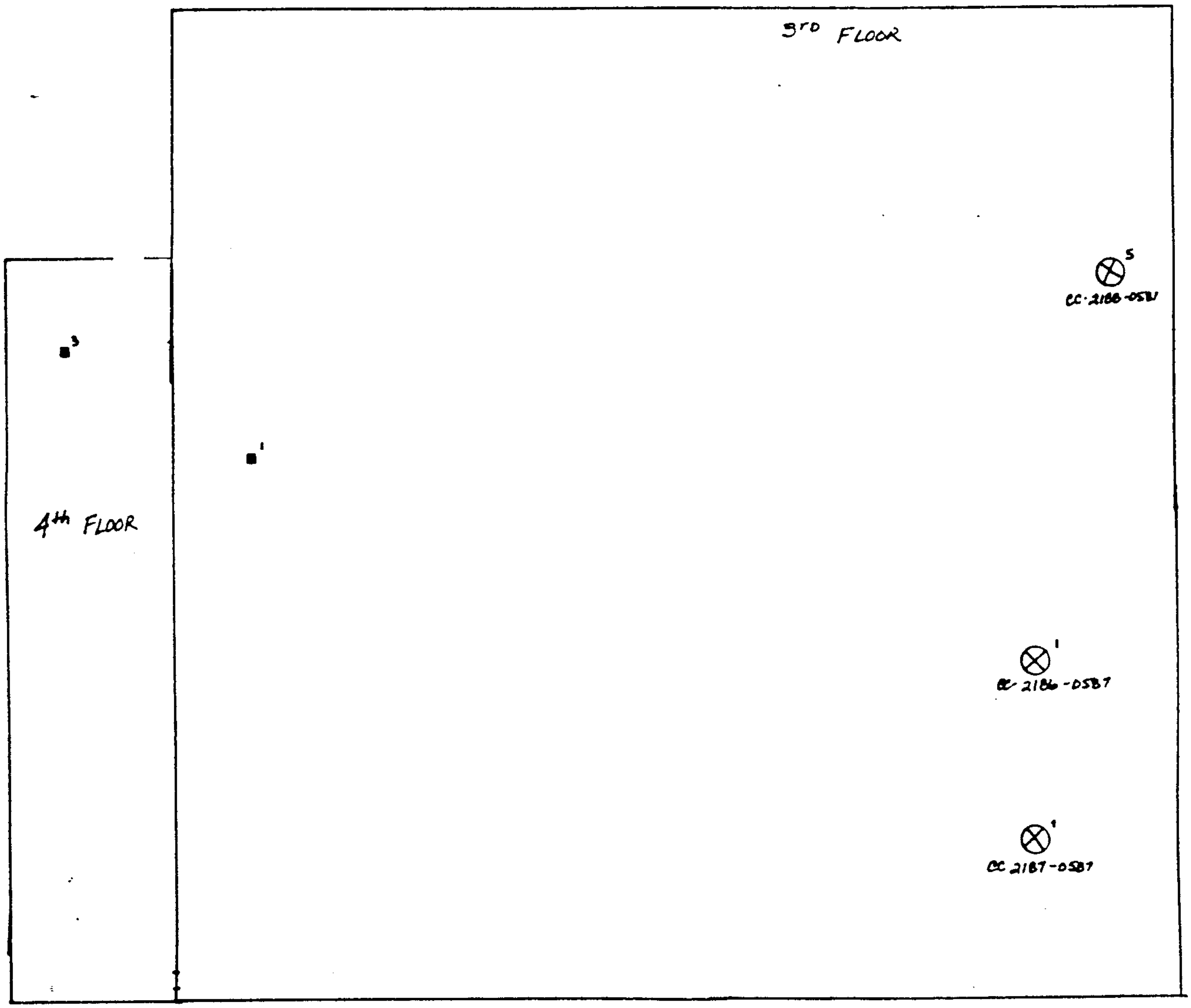
TITLE: BLDG 401 - STEAM PLANT - 1ST FLOOR	
PROJECT NAME: WELDON SPRING	
DATE: 5-13-87	DRAWN: JM
PROJECT #: 01-8529-00	APPROVED:
	SHEET ___ of ___



KEY	
⊗ 3 CC-2190-0587	Container Location Quantity And Number

N

JE JACOBS ENGINEERING GROUP INC. 12850 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215 TELEPHONE (303) 232-7098	
TITLE BLDG 401 STEAM PLANT 2nd FLOOR	
PROJECT NAME WELDON SPRING	
DATE 5-13-87	DRAWN JLM
	APPROVED
PROJECT 09-8529-00	SHEET ___ of ___



KEY

⊗ 5 CC-2188-0587 — CONTAINER LOCATION QUANTITY AND NUMBER

■ 1 — FIRE EXTINGUISHER LOCATION AND QUANTITY

N

JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7003

TITLE: BLDG 401 - STEAM PLANT 3rd FLOOR 4th FLOOR

PROJECT NAME: WELDON SPRING

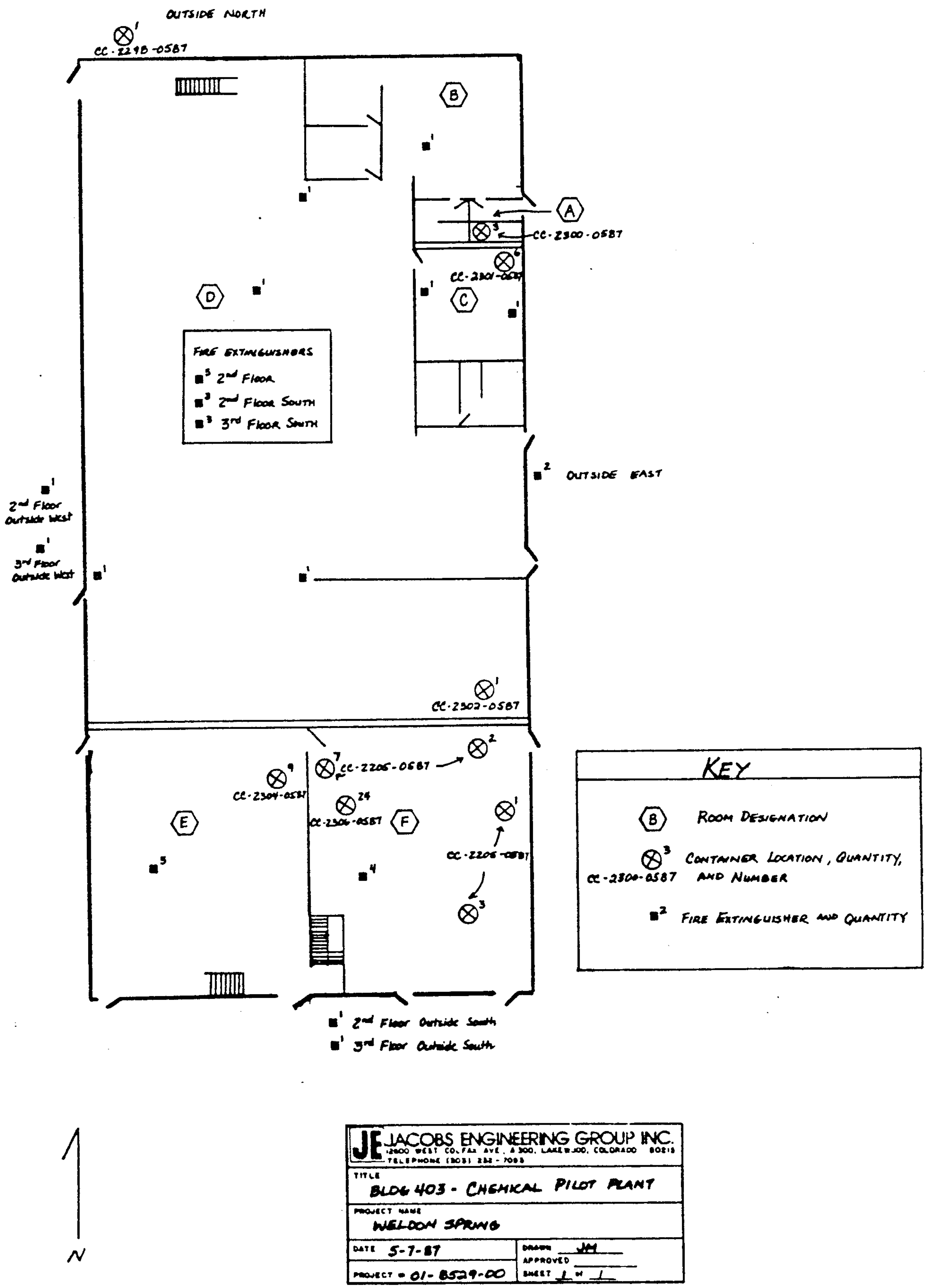
DATE: 5-12-87

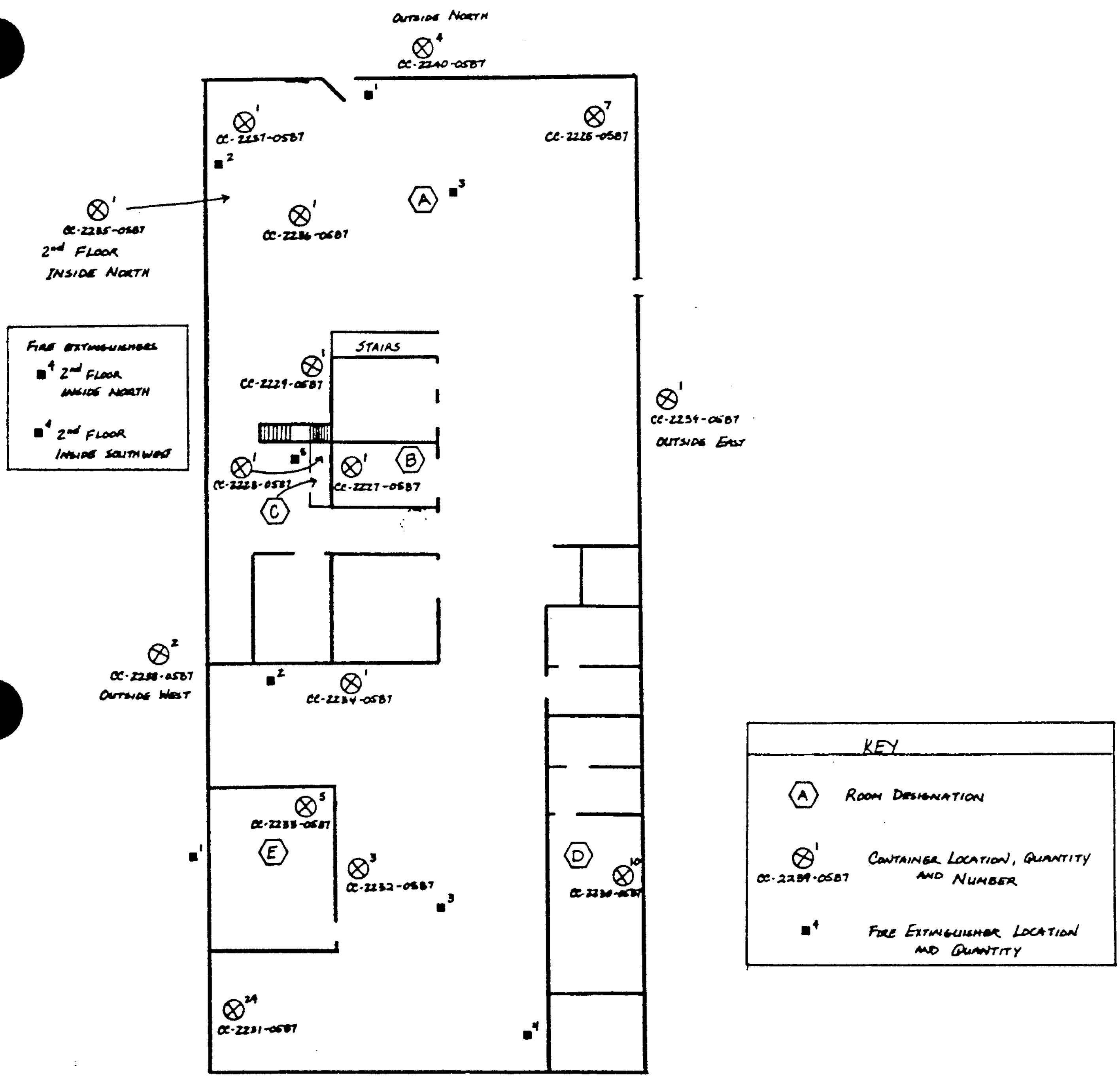
PROJECT: 09-8529-00

DRAWN: JM

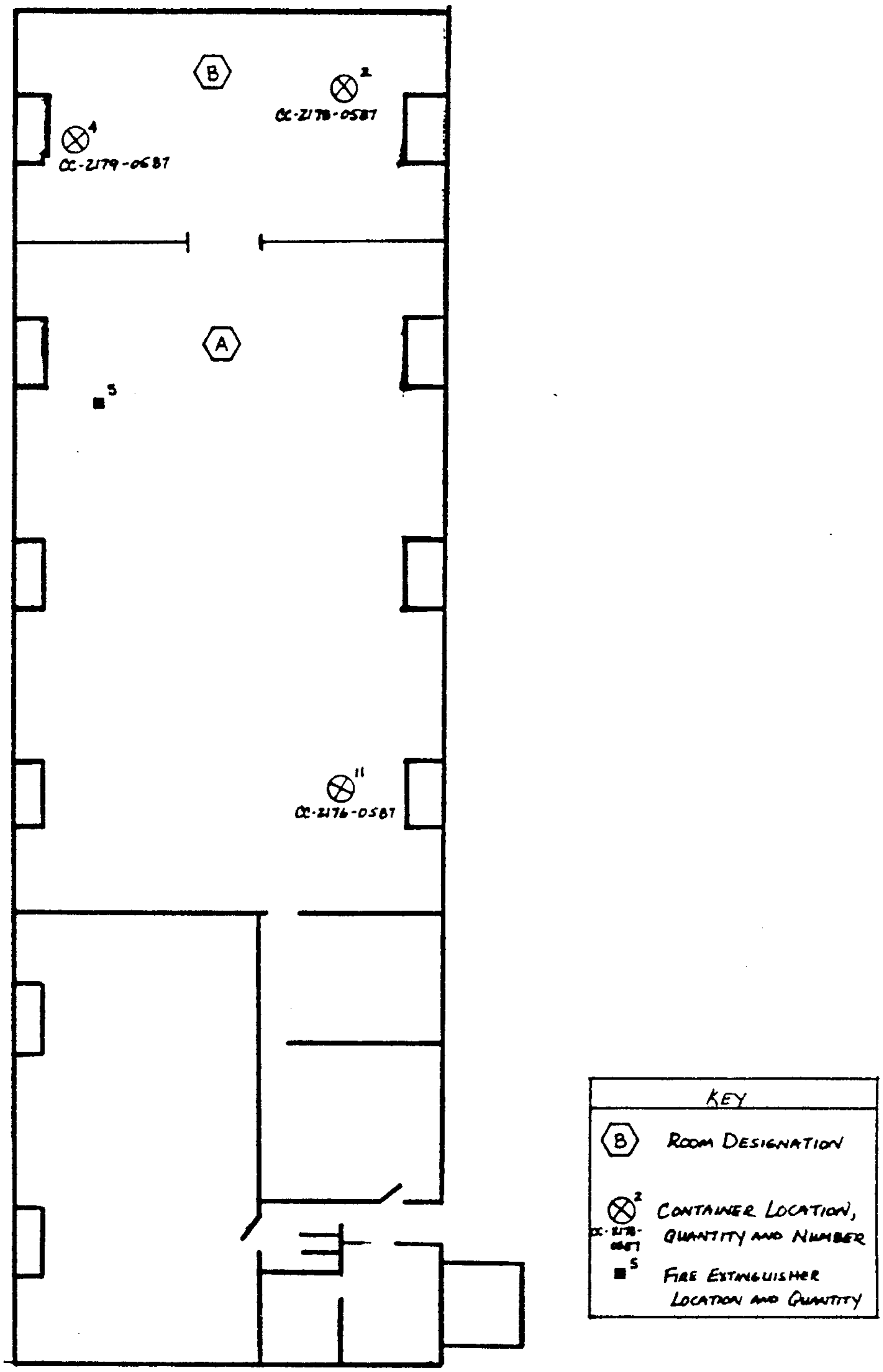
APPROVED: ____

SHEET __ of ____


OUTSIDE NORTH
CC-2298-0587
B
A
CC-2300-0587
CC-2301-0587
D
C
FIRE EXTINGUISHERS
2nd FLOOR
2nd FLOOR SOUTH
3rd FLOOR SOUTH
OUTSIDE EAST
2nd Floor Outside West
3rd Floor Outside West
CC-2302-0587
CC-2205-0587
CC-2304-0587
CC-2306-0587
E
F
CC-2206-0587
KEY
ROOM DESIGNATION
CONTAINER LOCATION, QUANTITY, AND NUMBER
CC-2300-0587
FIRE EXTINGUISHER AND QUANTITY
2nd Floor Outside South
3rd Floor Outside South
N
JACOBS ENGINEERING GROUP INC.
TITLE
BLDG 403 - CHEMICAL PILOT PLANT
PROJECT NAME
WELDON SPRING
DATE 5-7-87
DRAWN JM
APPROVED
PROJECT # 01-8529-00
SHEET 1 OF 1

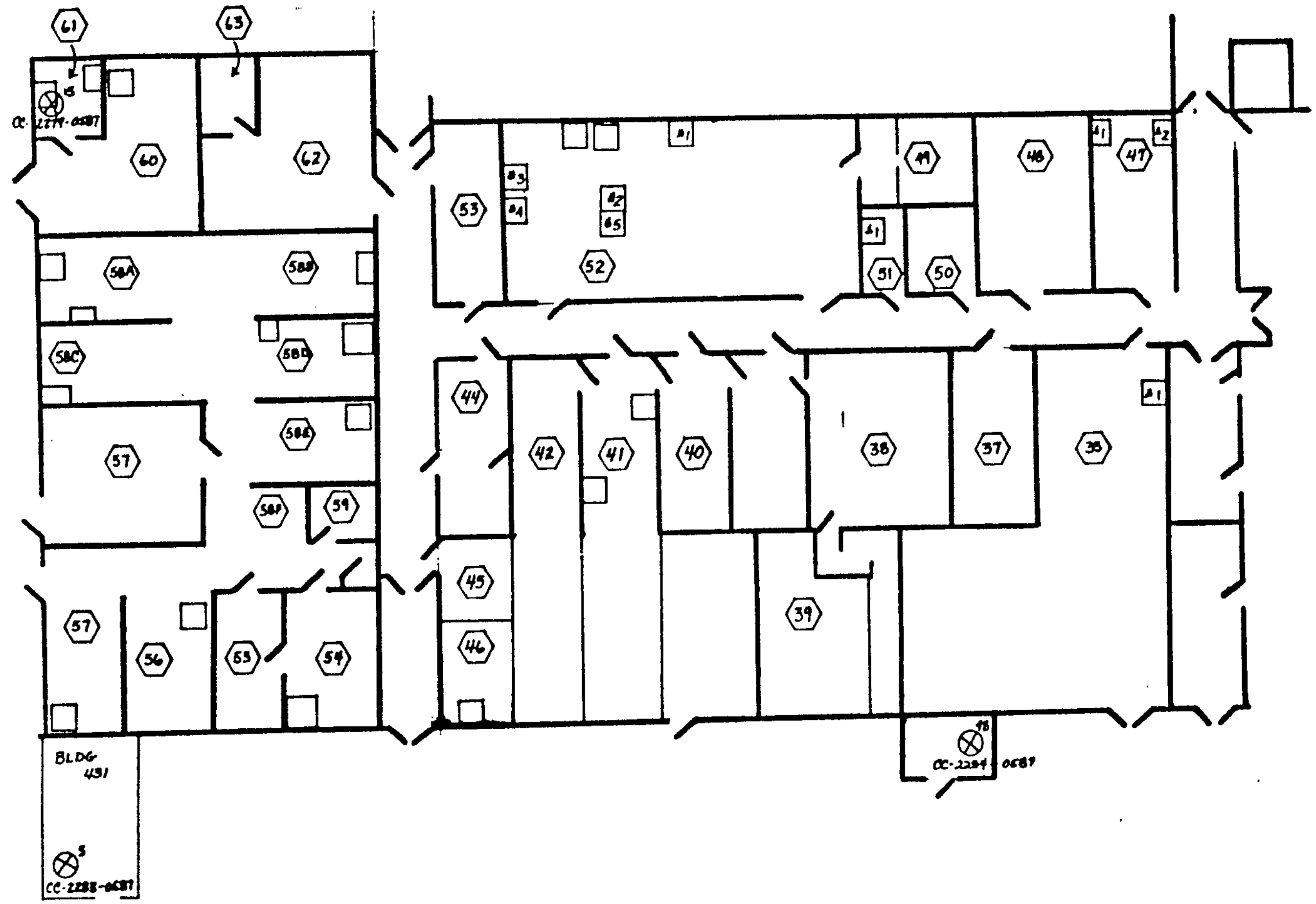


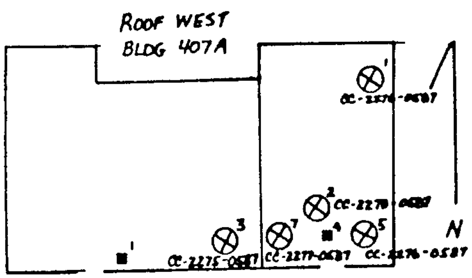
JE JACOBS ENGINEERING GROUP INC. 12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215 TELEPHONE (303) 232-7093	
TITLE BLDG 404 - METAL PILOT PLANT	
PROJECT NAME WELDON SPRING	
DATE 5-7-87	DRAWN JM
	APPROVED
PROJECT # 01-8529-00	SHEET 1 of 1



JACOBS ENGINEERING GROUP INC.
2600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7093

TITLE	BLDG 406 - WAREHOUSE
PROJECT NAME	Weldon Spring
DATE 5-7-87	DRAWN JM APPROVED
PROJECT # 01-8529-00	SHEET 1 of 1





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(45)	ROOM DESIGNATION
[#3]	SEALED LABORATORY HOODS
⊗[18] CC-2279-0587	CONTAINER LOCATION, QUANTITY AND NUMBER
■[4]	FIRE EXTINGUISHER LOCATION AND QUANTITY

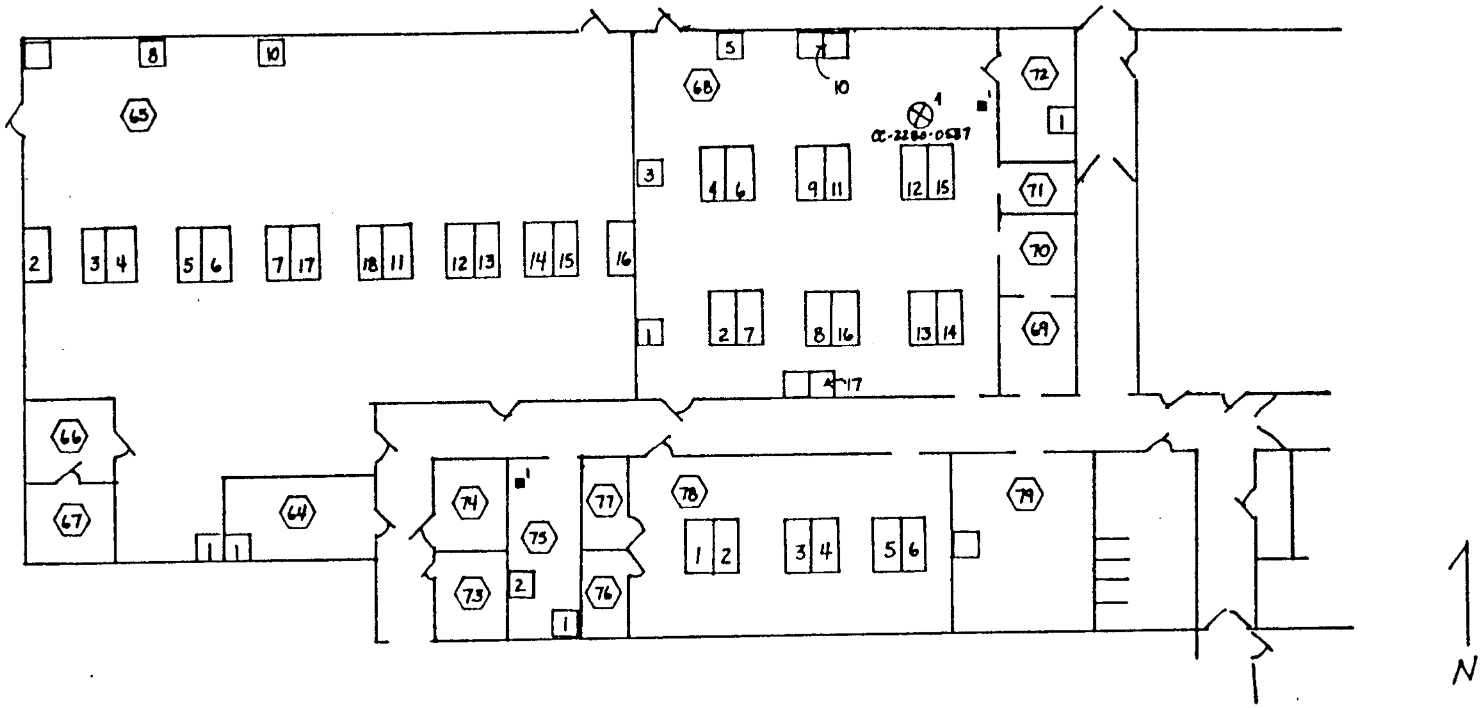
JE JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A 300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7098

TITLE: BLDG 407A - LABORATORY

PROJECT NAME: WELDON SPRING

DATE: 5-7-87 | DRAWN: JM
APPROVED:
PROJECT # 01-8529-00 | SHEET 1 OF 4

B	C
A	D



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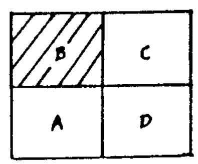
- (16) ROOM DESIGNATION
- ⊗ CC-2280-0587 (4): CONTAINER LOCATION, QUANTITY AND NUMBER
- ■ FIRE EXTINGUISHER LOCATION AND QUANTITY
- [1] [3|4] LABORATORY HOODS



JE JACOBS ENGINEERING GROUP INC.
1600 WEST COLFAX AVE., A.B.O., LAKEWOOD, COLORADO 80215
TELEPHONE (303) 282-7003

TITLE: BLDG 407B - LABORATORY

PROJECT NAME: WELDON SPRING

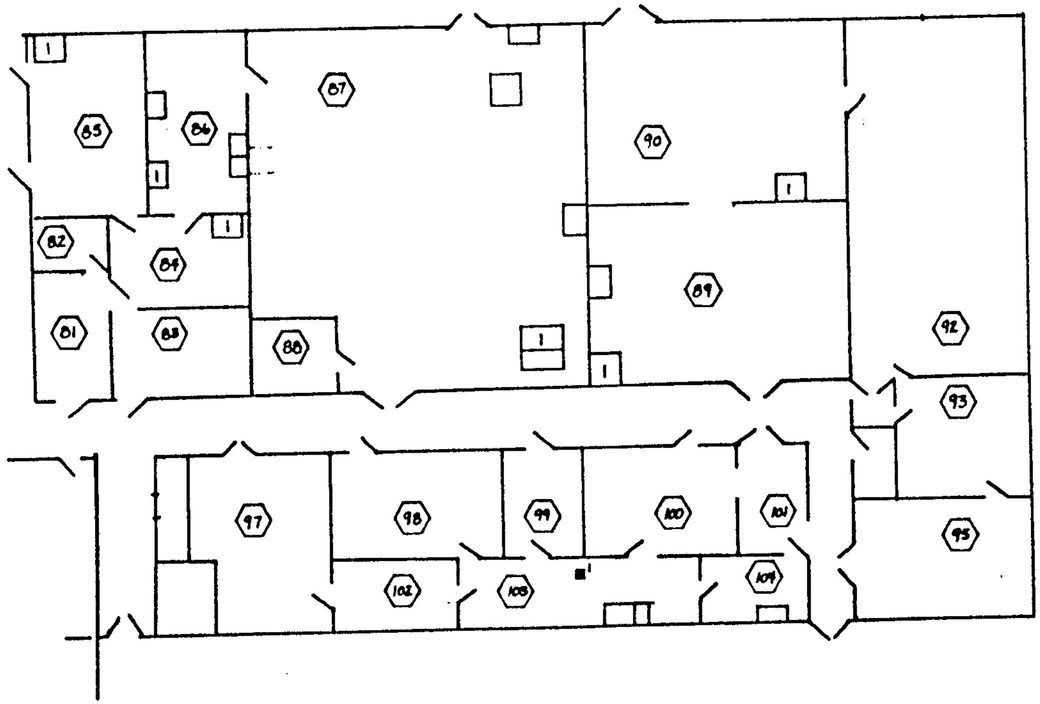
DATE: 6-18-87

PROJECT #: 01-8529-00

DRAWN: JH

APPROVED:

SHEET ___ OF ___

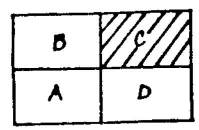


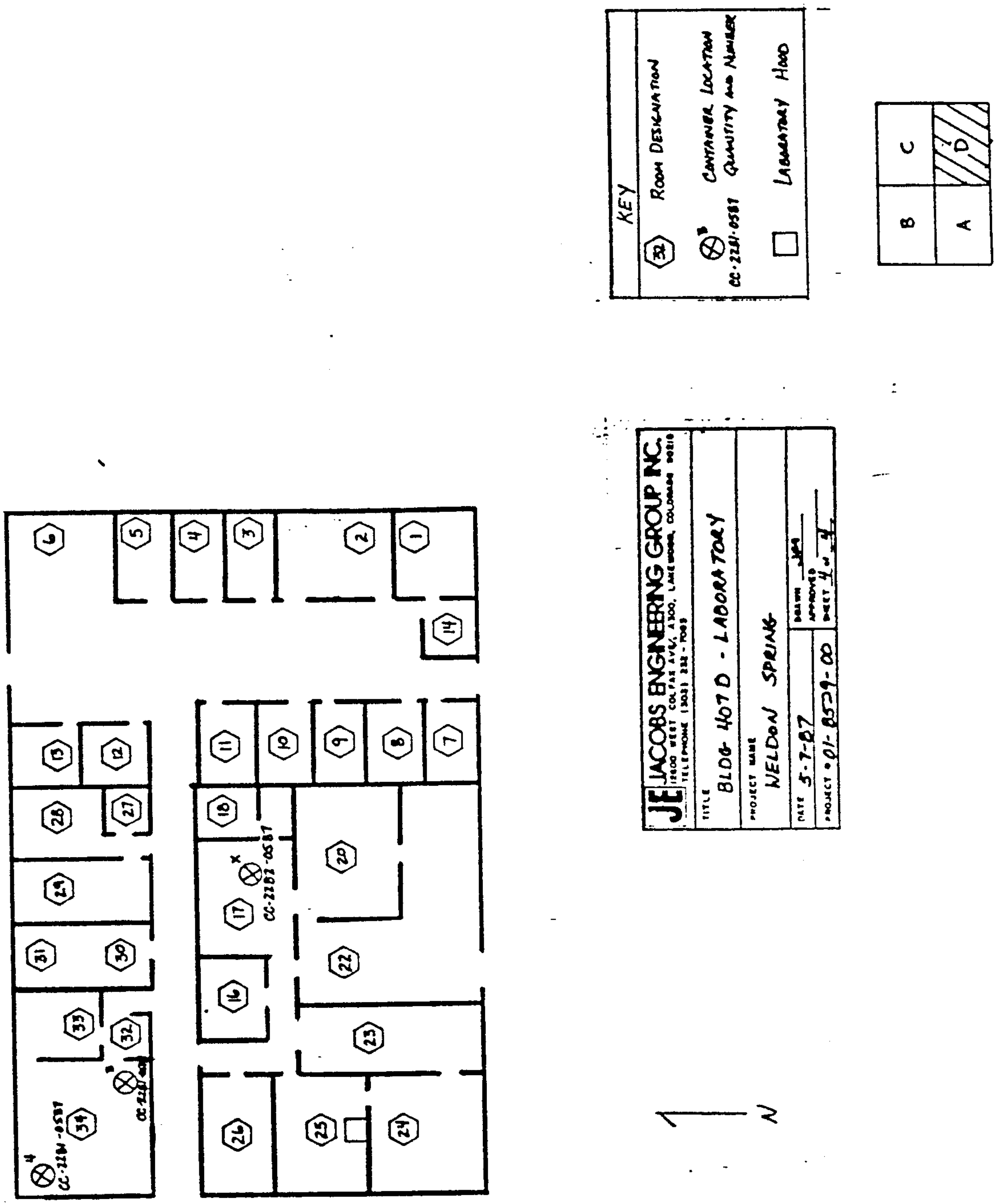
KEY

- (102) ROOM DESIGNATION
- SEALED LABORATORY HOOD OR CABINET
- FIRE EXTINGUISHER LOCATION & QUANTITY

JE JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 238-7000

TITLE BLDG 407C - LABORATORY	
PROJECT NAME WELDON SPRING	
DATE 5-7-87	DRAWN JH
	APPROVED
PROJECT # 01-B529-00	SHEET 2 of 4




KEY
ROOM DESIGNATION
CONTAINER LOCATION QUANTITY AND NUMBER
LABORATORY HOOD
B
C
A
D
JACOBS ENGINEERING GROUP INC.
TITLE
BLDG-407D - LABORATORY
PROJECT NAME
WELDON SPRING
DATE 5-7-87
PROJECT # 01-8529-00
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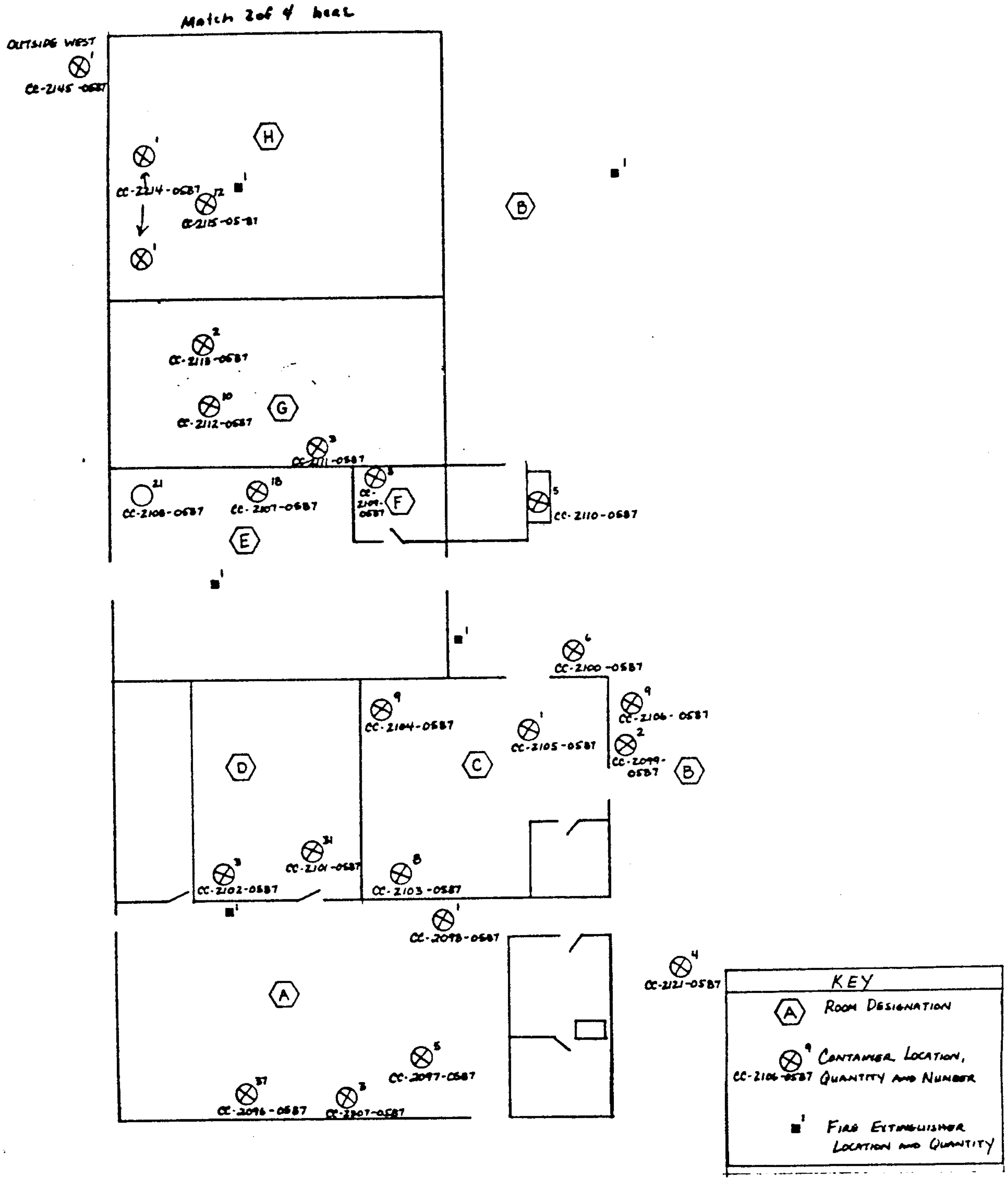

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JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 238-7083

TITLE: BLDG 408(A) - MAINTENANCE and STORES

PROJECT NAME: WELDON SPRING

DATE: 5-7-87

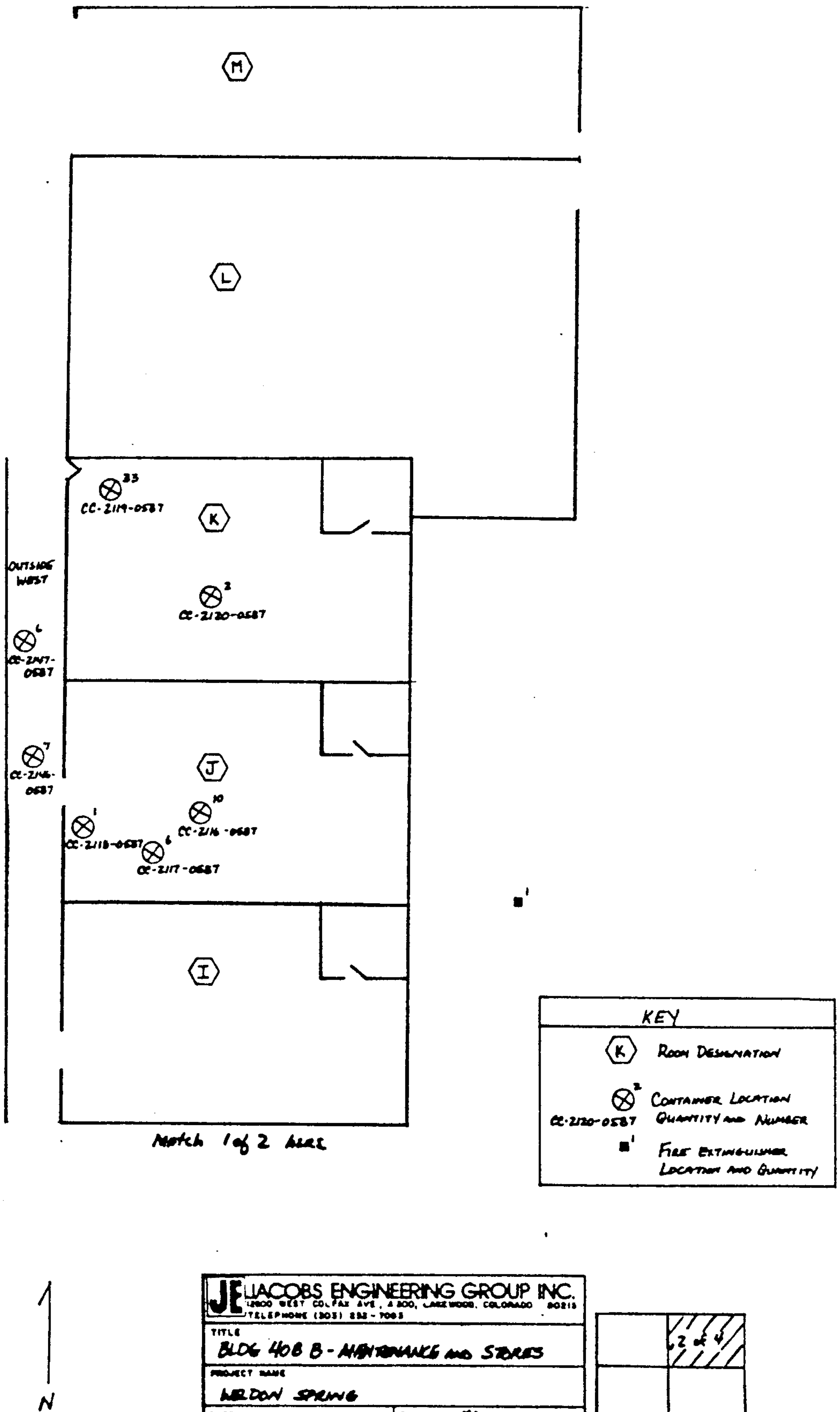
DRAWN: JM

APPROVED:

PROJECT #: 01-8529-00

SHEET 1 of 4

1 of 4



JACOBS ENGINEERING GROUP INC.

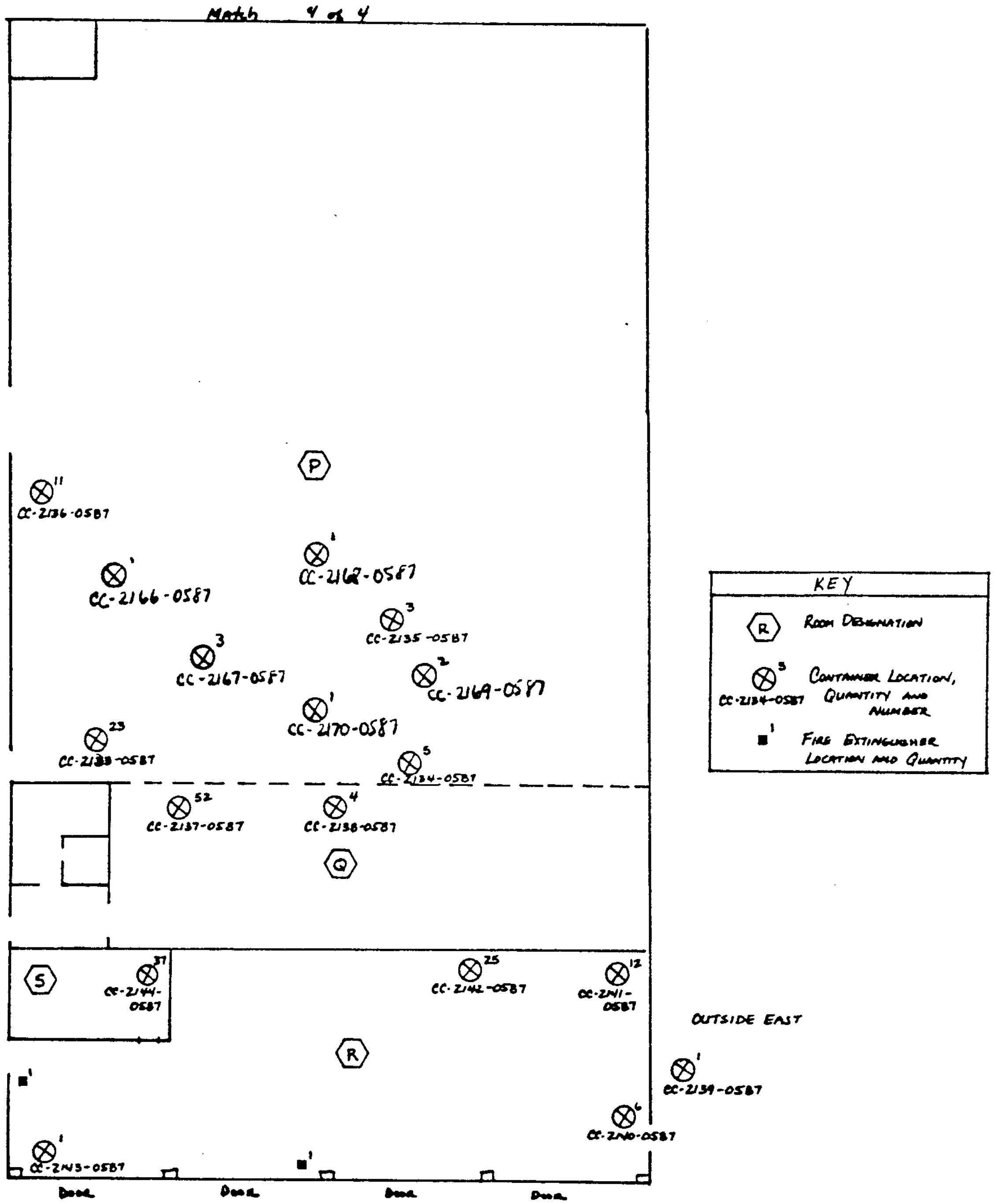
TITLE: BLDG 408 B - MAINTENANCE AND STORES

PROJECT NAME: WELDON SPRING

DATE: 5-7-87

PROJECT #: 01-8529-80

SHEET 2 OF 4



JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7093

TITLE: BLDG 408 C - MAINTENANCE AND STORES

PROJECT NAME: WELDON SPRING

DATE: 5-7-87

PROJECT #: 01-8529-00

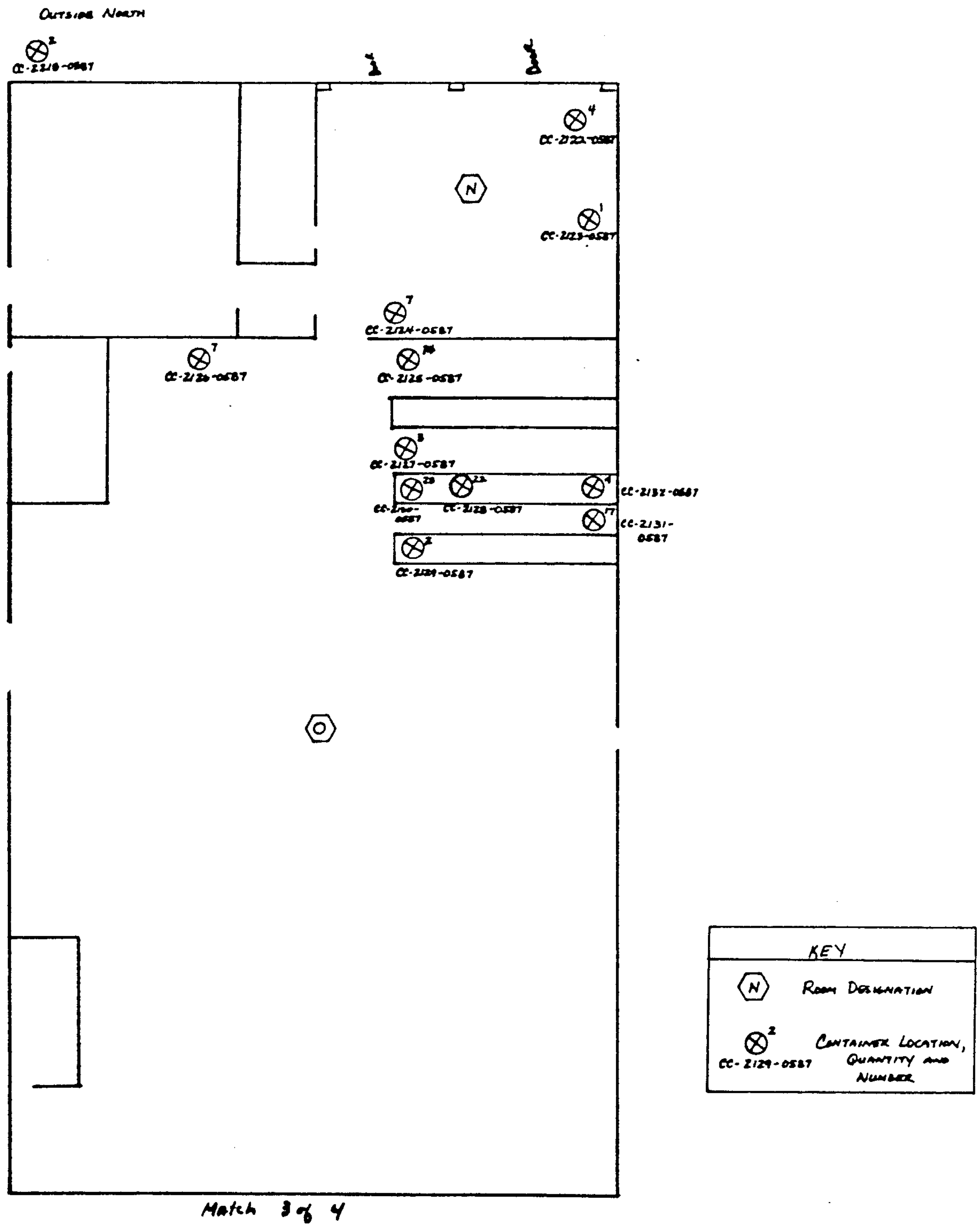
DRAWN:

APPROVED:

SHEET 3 of 4

3 of 4

N BLDG 408 C



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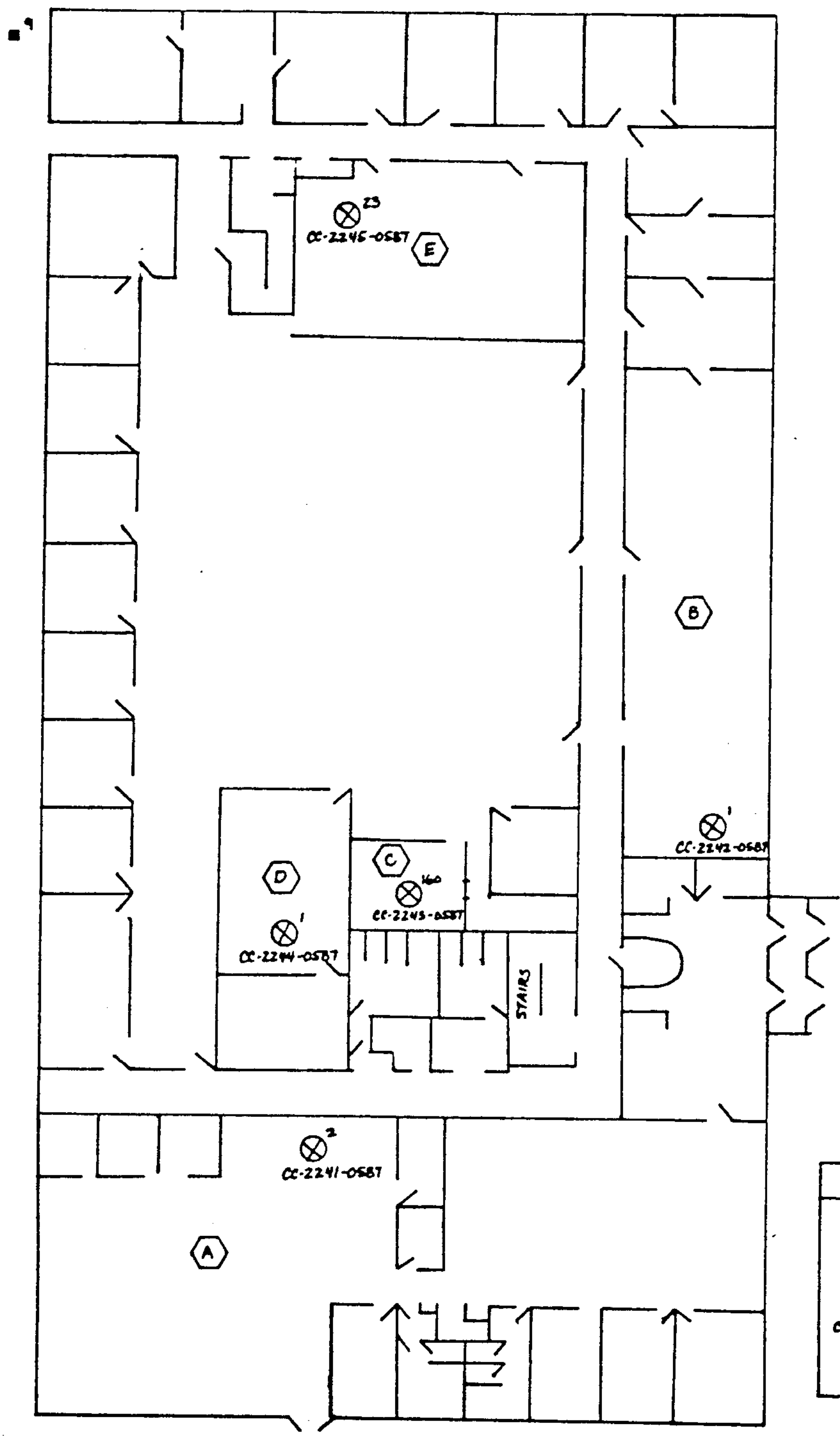
JE JACOBS ENGINEERING GROUP INC. 12600 WEST COLFAX AVE., A 300, LAKEWOOD, COLORADO 80215 TELEPHONE (303) 232-7083	
TITLE BLDG 408 D - MAINTENANCE AND STORES	
PROJECT NAME WELDON SPRING	
DATE 5-7-87	DRAWN JM
	APPROVED
PROJECT # 01-8529-00	SHEET 4 OF 4

4 of 4



KEY

D Room Designation

1 CC-2244-0587 Container Location Quantity and Number

9 Fire Extinguisher Location and Quantity

N

JE JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7093

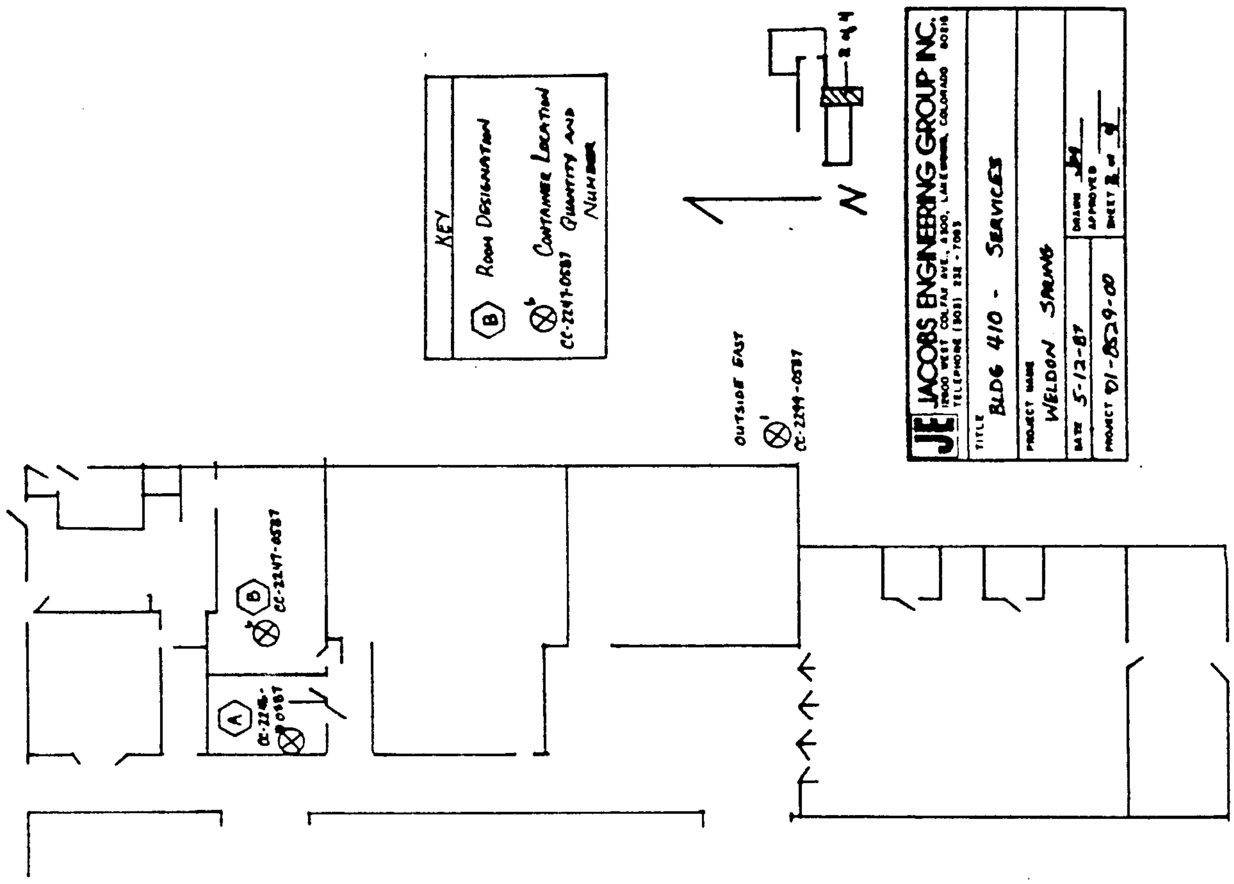
TITLE BLDG 409 - ADMINISTRATION FIRST FLOOR

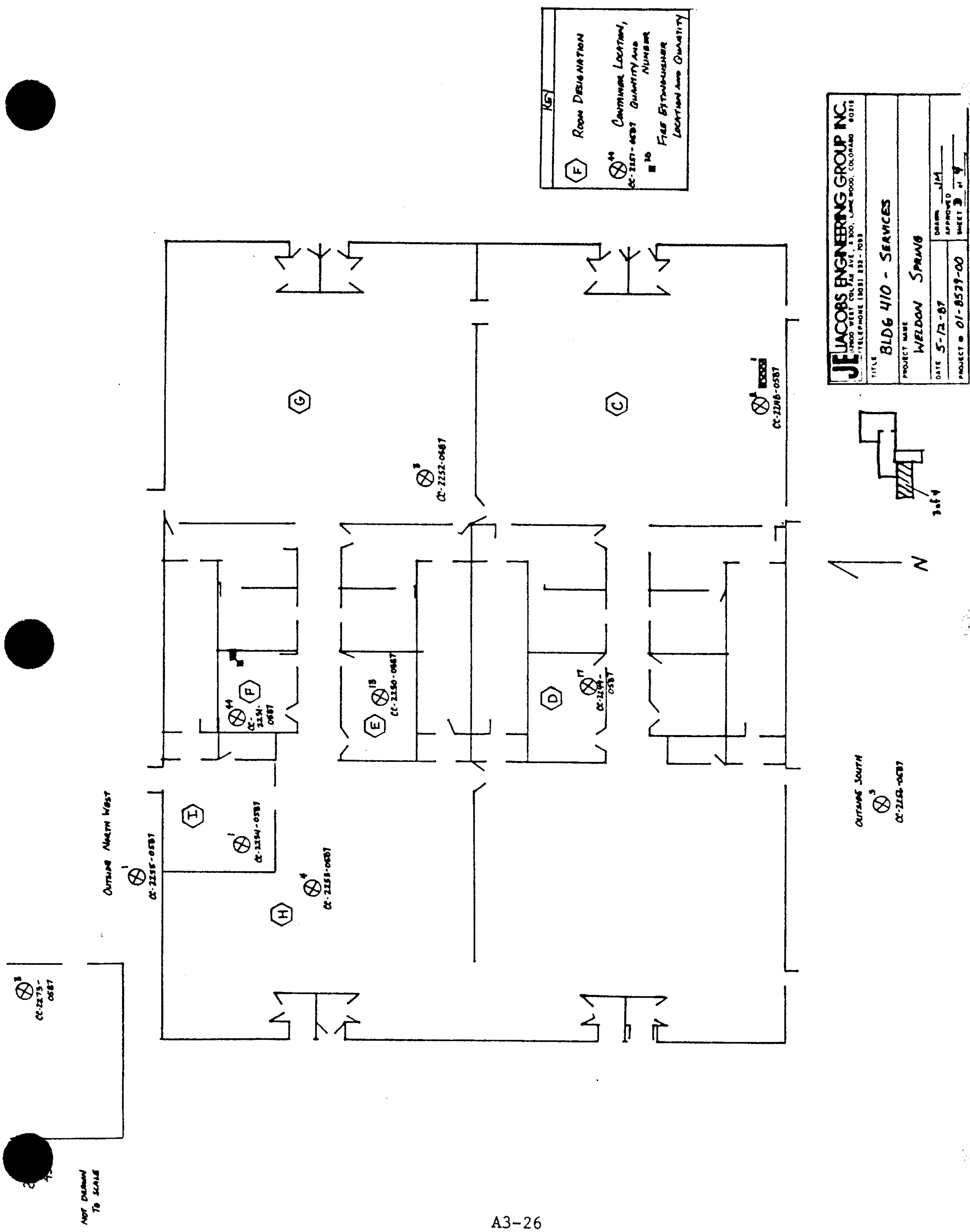
PROJECT NAME WELDON SPRING

DATE 3-11-87 DRAWN JM

APPROVED

PROJECT # 01-8529-00 SHEET 1 of 1


KEY
B Room Designation
Container Location Quantity and Number
OUTSIDE EAST
A
B
N
JACOBS ENGINEERING GROUP INC.
TITLE BLDG 410 - SERVICES
PROJECT NAME WELDON SPRING
DATE 5-12-87



Room Designation
Container Location, Quantity and Number
CC-2251-0587
Fire Extinguisher Location and Quantity
JACOBS ENGINEERING GROUP INC.
BLDG 410 - SERVICES
WELDON SPRING
DATE 5-12-87
PROJECT # 01-8529-00
DRAWN JM
APPROVED
SHEET 3 of 4
G
C
CC-2252-0587
CC-2248-0587
F
CC-2251-0587
E
CC-2250-0587
D
CC-2249-0587
I
CC-2254-0587
H
CC-2253-0587
Outside North West
CC-2255-0587
Outside South
CC-2252-0587
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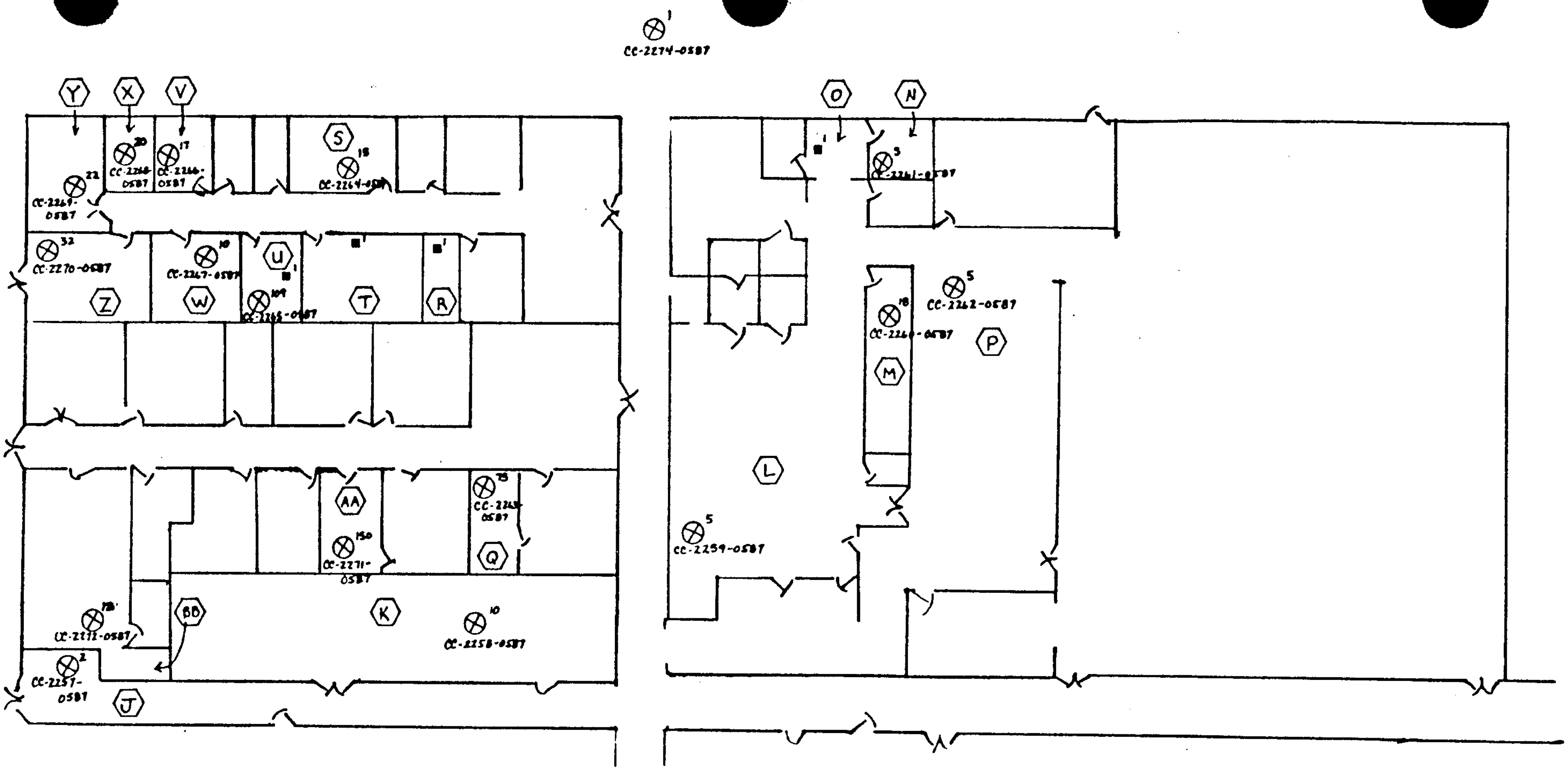
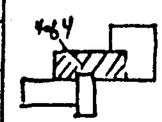
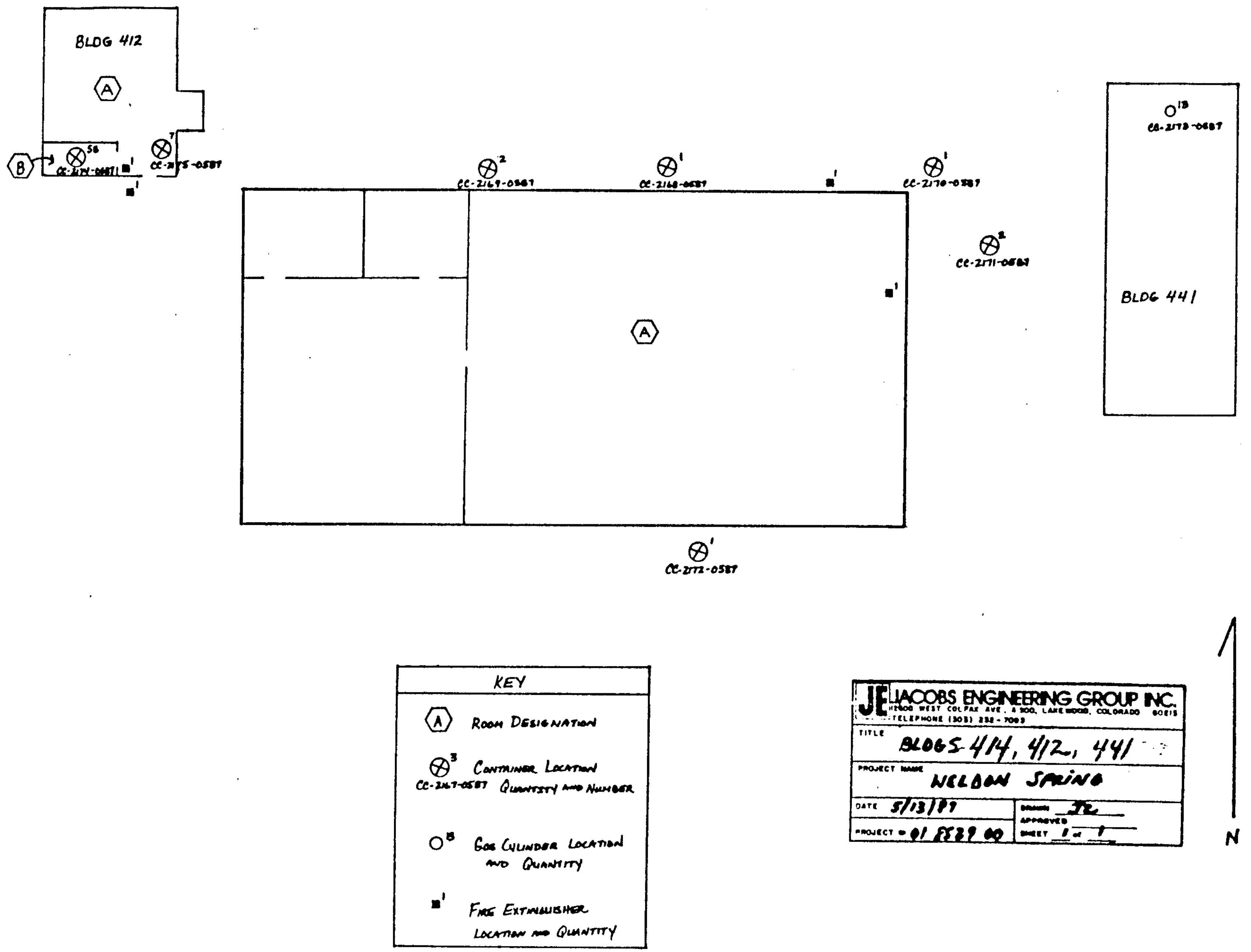
Not Drawn To Scale



KEY	
(U)	Room Designation
⊗[109] CC-2265-0587	Container Location Quantity and Number
■	Fire Extinguisher Location and Quantity

JE JACOBS ENGINEERING GROUP INC. 12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215 TELEPHONE (303) 232-7088	
TITLE BLDG 410 Services	
PROJECT NAME Weldon Spring	
DATE 5/12/89	DRAWN JZ
PROJECT # 01-8529-00	APPROVED SHEET 4 OF 4




BLDG 412
A
B
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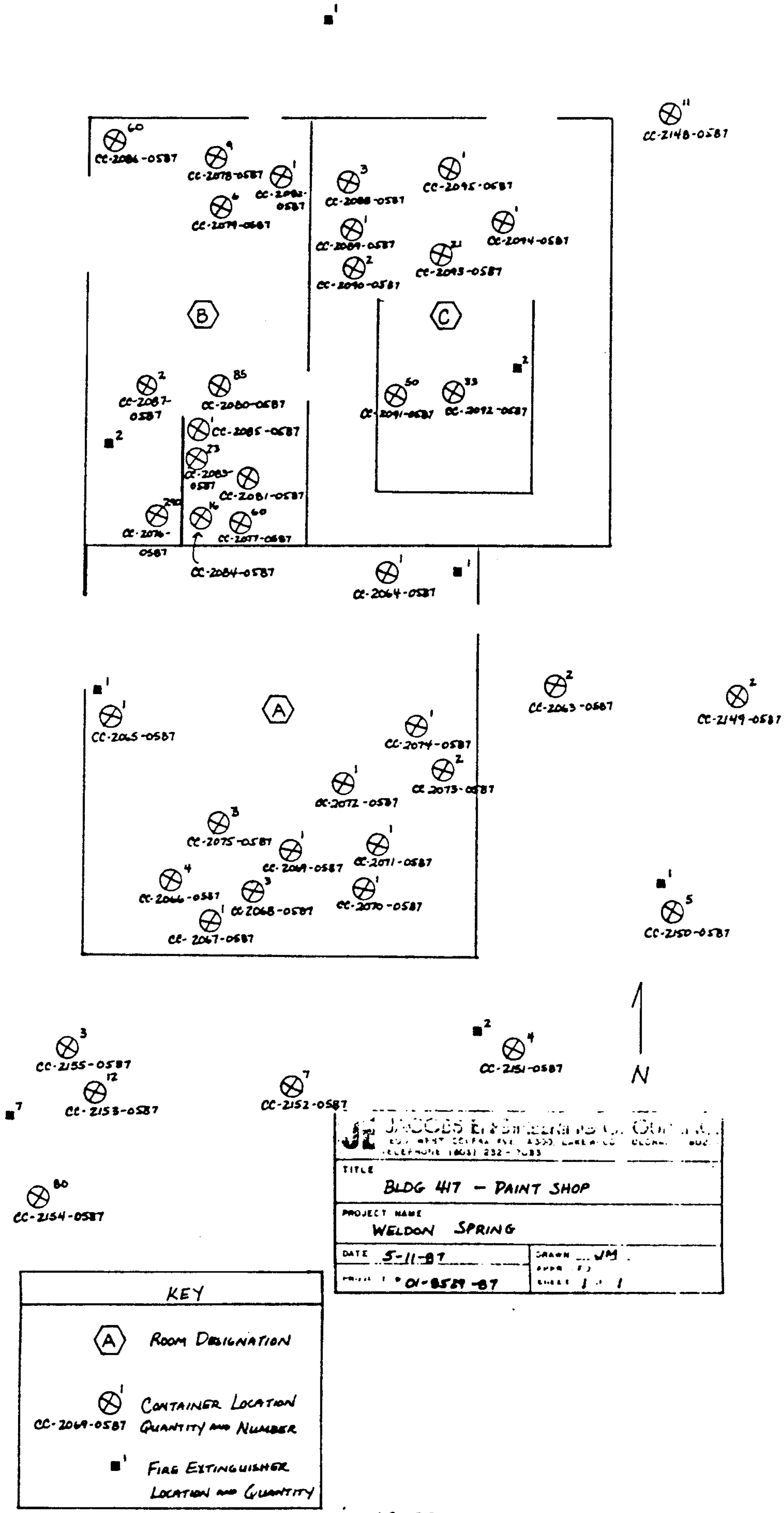
CC-2175-0587
CC-2169-0587
CC-2168-0587
CC-2170-0587
CC-2171-0587
CC-2172-0587
CC-2173-0587
BLDG 441
KEY
Room Designation
Container Location Quantity and Number
CC-2167-0587
Gas Cylinder Location and Quantity
Fire Extinguisher Location and Quantity
JACOBS ENGINEERING GROUP INC.
TITLE BLDGS 414, 412, 441
PROJECT NAME WELDON SPRING
DATE 5/13/87
PROJECT # 01 F829 00
DRAWN
APPROVED
SHEET 1 of 1
N


B
C
A
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CC-2153-0587
CC-2152-0587
CC-2151-0587
CC-2154-0587
N
TITLE
BLDG 417 – PAINT SHOP
PROJECT NAME
WELDON SPRING
DATE 5-11-87
01-8529-87
DRAWN JM
SHEET 1 of 1
KEY
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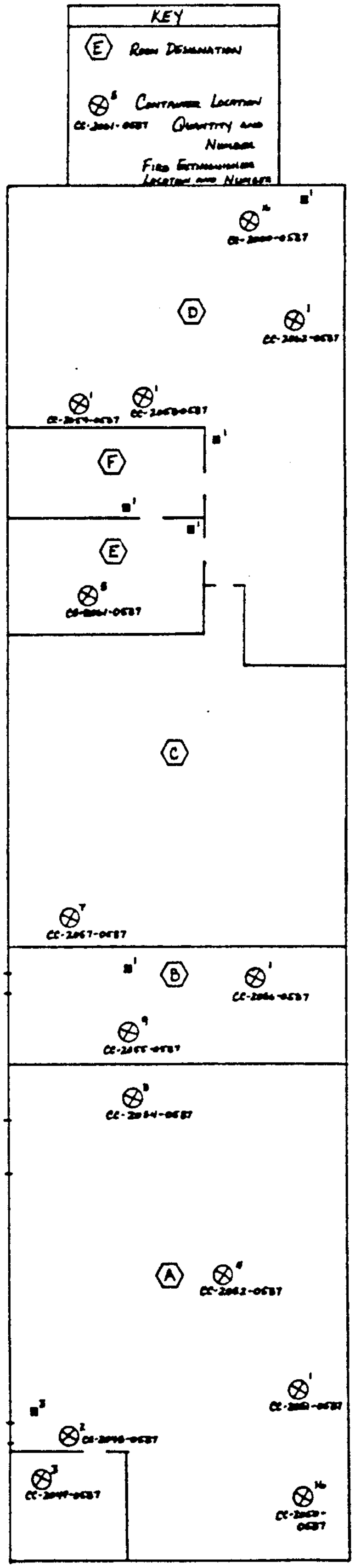
CC-2069-0587 Container Location Quantity and Number
Fire Extinguisher Location and Quantity



JACOBS ENGINEERING GROUP INC.

TITLE BLDG 433 - STORAGE

PROJECT NAME WELDON SPRING

DATE 5-12-87

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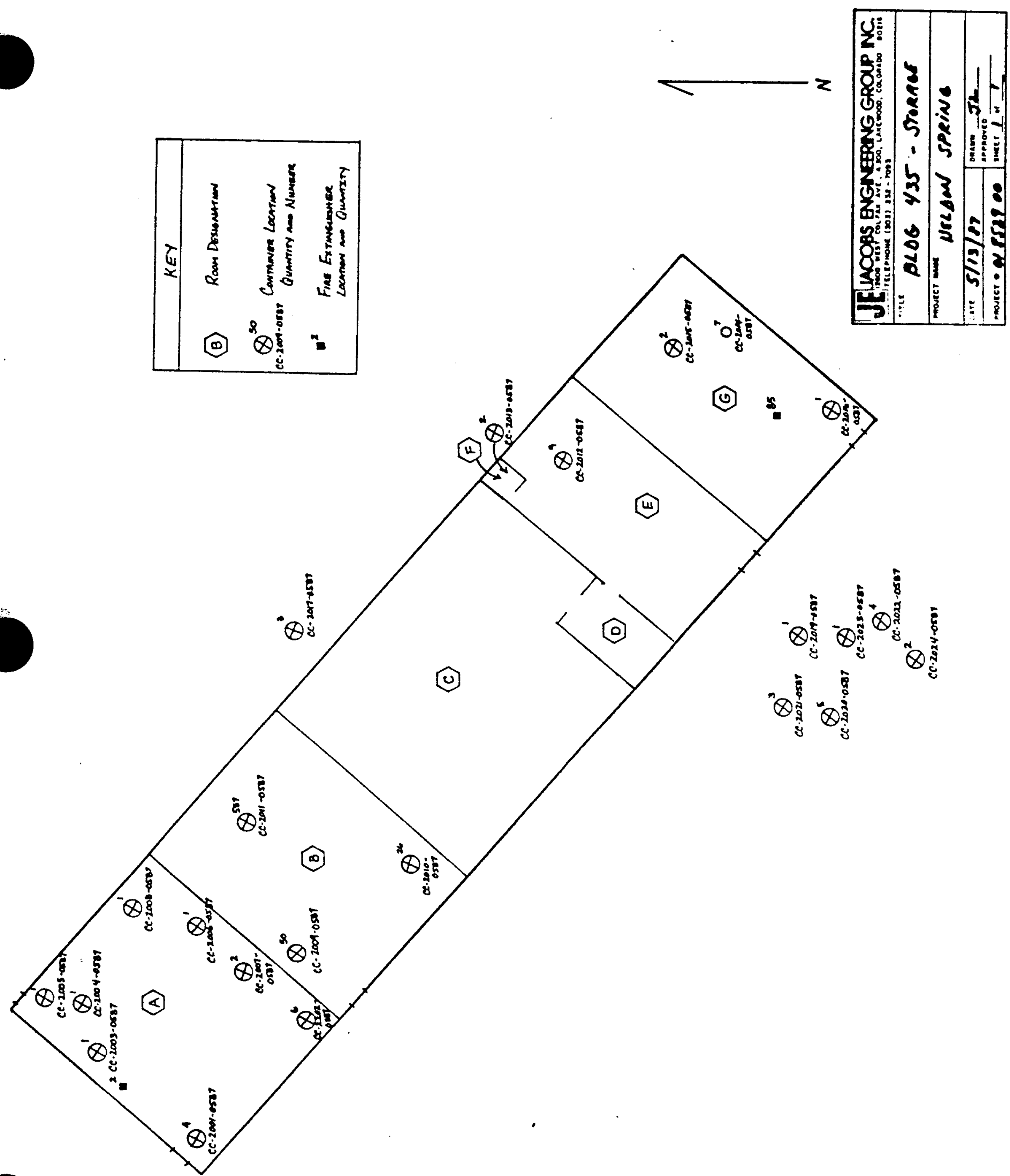
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Room Designation
Container Location Quantity and Number
Fire Extinguisher Location and Quantity
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JACOBS ENGINEERING GROUP INC.
TITLE BLDG 435 - STORAGE
PROJECT NAME UELBAW SPRING
DATE 5/13/87
DRAWN
APPROVED
SHEET 1 of 1
A
B
C
D
E
F
G
CC-2001-0587
CC-2003-0587
CC-2004-0587
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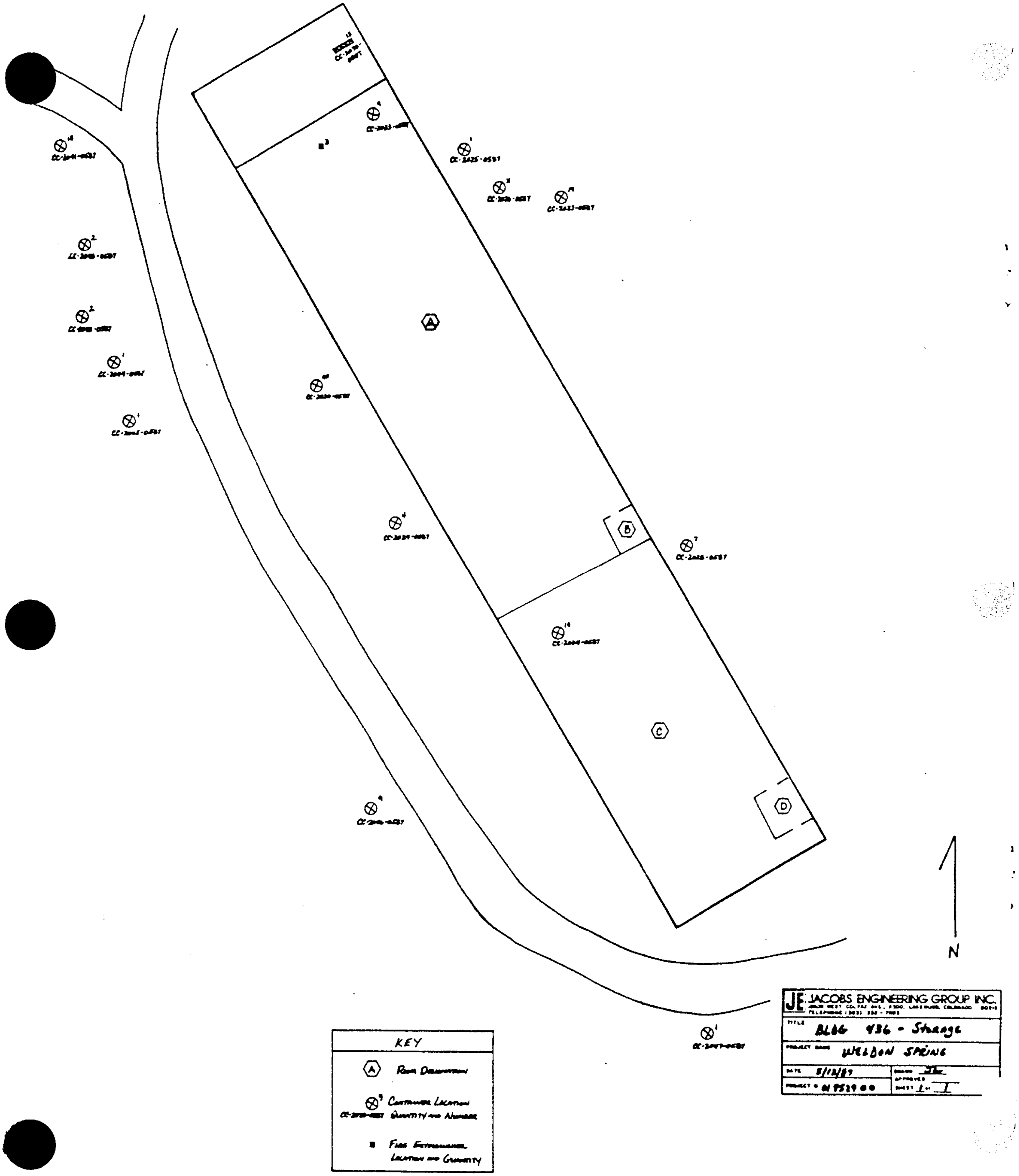
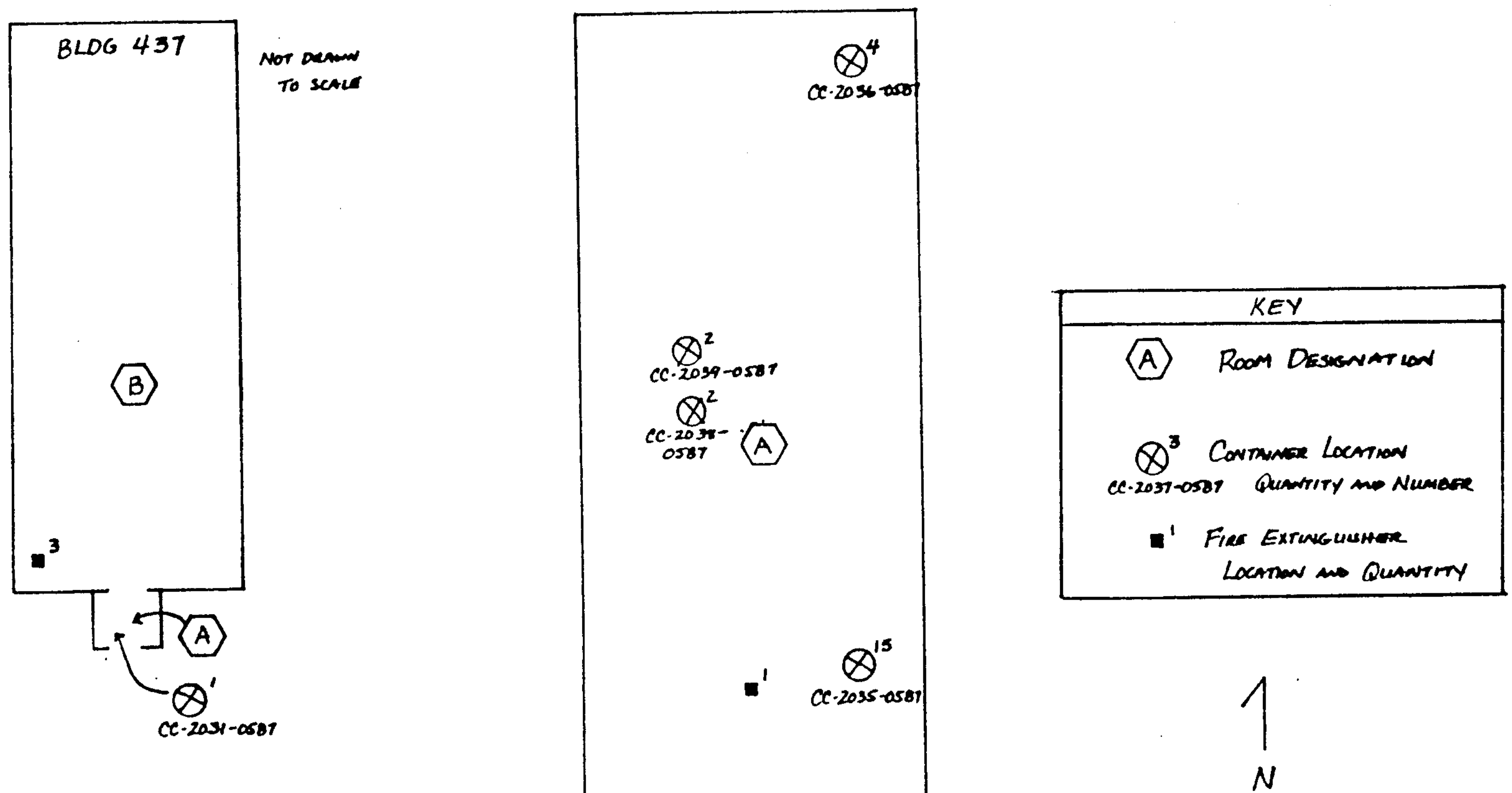
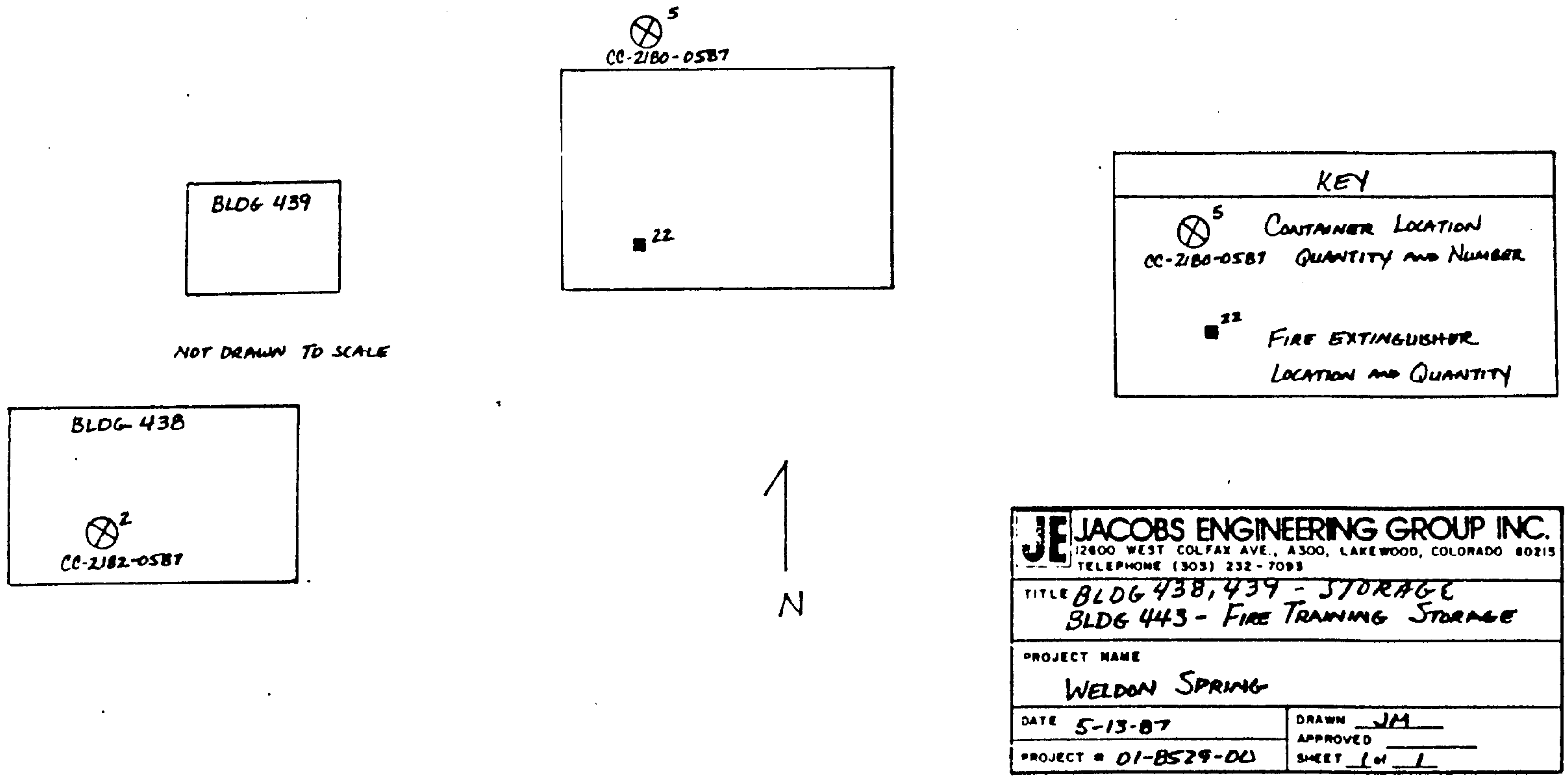

A
B
C
D
N
KEY
Container Location
Quantity and Number
Location and Quantity
JACOBS ENGINEERING GROUP INC.
TITLE
BLDG 436 - Storage
PROJECT NAME
WELDON SPRING
SHEET 1 OF 1



JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A 300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7093

TITLE BLDG 438 - STORAGE	
PROJECT NAME WELDON SPRING	
DATE 5-13-87	DRAWN JM
	APPROVED
PROJECT # 01 8529 00	SHEET 1 of 1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BLDG 439
22
NOT DRAWN TO SCALE
BLDG 438
2
CC-2182-0587
N
KEY
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CC-2180-0587
CONTAINER LOCATION
QUANTITY AND NUMBER
22
FIRE EXTINGUISHER
LOCATION AND QUANTITY
JE JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX AVE., A300, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7093
TITLE BLDG 438, 439 - STORAGE
BLDG 443 - FIRE TRAINING STORAGE
PROJECT NAME
WELDON SPRING
DATE 5-13-87
PROJECT # 01-B529-00
DRAWN JM
APPROVED
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SPECIAL CONDITIONS

MK-FERGUSON CONSTRUCTION SUBCONTRACTS

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SC-1 WORK TO BE ACCOMPLISHED

The work scope consists of furnishing all labor, supervision, equipment and materials (except as otherwise specified), and performing all work in strict accordance with Federal, State and Local laws, codes and regulations. The work in general consists of: CONTAINERIZED WASTE HANDLING, TRANSPORT, AND DISPOSAL.

The above description of work is for general information only and in no way limits the responsibility of the Subcontractor for constructing the Work in strict accordance with the subcontract drawings and specifications.

SC-2 DEFINITIONS

A. See GP-2 For General Definitions

B. The term "Contractor's Inspector" shall mean the Duly Authorized Quality Assurance Representative of the Contractor.

C. The term "Contractors Representative" shall mean the duly authorized "Construction Engineer" of the Contractor.

SC-3 LOCATION

The work to be accomplished is located at the abandoned Uranium Feed Materials Processing Plant at Weldon Spring, Missouri.

SC-4 HOLIDAYS

The following will be observed as holidays by the Contractor:

* Christmas Day
  Columbus Day
* New Year's Day
  Presidents' Day
  Memorial Day
* Independence Day
  Labor Day
  Thanksgiving Day
  Day Following Thanksgiving

* Holidays occurring on Saturday or Sunday will be on Friday or Monday.

Upon written notice from the Subcontractor 5 days in advance, the Contractor will adequately man the job on Contractor holidays not observed by the Subcontractor.

SC-5 SITE ACCESS

A. Access to the site is via the main gate on Highway 94 South. The gate is normally open from 7 a.m. to 6 p.m. and the normal work day is from is 8 a.m. to 4:30 p.m., Monday thru Friday.

B. Controls are established at the Weldon Spring site to govern personnel access. A guard station is located approximately 50 feet inside the main gate.

C. All privately and Subcontractor owned vehicles shall stop at the guard station.

D. The Subcontractor will have a specific identification symbol prominently displayed on each vehicle for entry to the site. A sample of this symbol will be given to MK-F prior to starting work.

E. If no specific identification symbol is displayed on a vehicle, each person shall sign in and out with the guard before entry to the site when entering and leaving the site.

SC-6 TEMPORARY UTILITIES

A. Telephone Service

Telephone service will not be provided by the Contractor. The Subcontractor shall make his own arrangements for any telephone service desired.

B. Electrical Power for Construction

Electrical power for construction will not be provided by the Contractor. The Subcontractortor shall make his own arrangements for construction power.

C. Toilet and Washroom Facilities

Toilet and washroom facilities shall be provided by the Contractor. Emergency showers are available in Trailer 7, AND THE SHOWER TRAILER AT THE ACCESS CONTROL POINT.

D. Temporary Water Facilities

1. Drinking water shall be furnished by the Subcontractor.

2. If authorized by the Contractor, temporary supply lines, standpipes, and connections over and above those facilities presently existing and available shall be furnished and installed by the Subcontractor and shall be removed upon the completion of the need for such temporary facilities.

SC-7 CONSTRUCTION RESTRAINTS

A. There are no known restraints at this time. The Subcontractor should be aware that more than one subcontractor may be working in the areas identified in the Work Scope. These areas are to be used jointly and the Subcontractor shall coordinate his work activities with other ongoing activities.

B. See GC-19 For General Requirements

SC-8 TEMPORARY STORAGE OF CONSTRUCTION MATERIAL

The Contractor will provide space for storage of materials and equipment during performance of the Work Scope.

The Subcontractor is responsible for the security of his equipment and material.

SC-9 CLEANUP AND WASTE DISPOSAL

A. Cleanup

The Subcontractor shall maintain a neat and orderly work area. Cleanup of the construction work areas shall be required on a daily basis. Waste and debris shall not be allowed to accumulate in such quantities as to create an unsightly appearance, a safety or fire hazard. All construction areas shall be thoroughly cleaned to the satisfaction of the Contractor prior to final acceptance of the completed project(s).

B. <u>Waste Disposal</u>

The Subcontractor shall provide suitable receptacles and dispose of all waste material such as paper, discarded containers, scrap lumber, scrap metals, etc., by removal from the work area to on-site disposal or storage areas.

SC-10 <u>CONSTRUCTION HEALTH AND SAFETY</u>

A. <u>Contractor Safety Program</u>

1. Subcontractors shall comply with all applicable Local, State, DOE/WSSRAP and Federal Safety Codes, Regulations, Standards and Special Procedures.

   Subcontractor shall comply with the MK-Ferguson Construction Safety and Health Management Program. A Subcontractor may submit his own Safety Program to the Contractor for review. The Subcontractor's program must be equal to or more stringent than the WSSRAP Construction Safety and Health Program for acceptance and use. The Subcontractor's Safety and Health Program shall be an integral part of this Subcontract including mandatory implementation and compliance by the Subcontractor.

2. During the Pre-Bid Meeting a copy of the WSSRAP Construction Safety and Health Management Program will be made available for review per request. The successful bidder will be issued a copy with the Notice of Award by the Contractor's Subcontract Administrator. A Table of Contents for the WSSRAP Safety and Health Program is presented on Figure 1.

Figure 1

SAFETY AND HEALTH MANAGEMENT PROGRAM

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B. <u>CONSTRUCTION SAFETY & HEALTH INITIAL INDOCTRINATION & TRAINING</u>

1. All Subcontractor personnel working on the site shall receive the basic Construction Safety and Health Initial Indoctrination and Training from the Construction Safety and Health Manager. The Indoctrination will be oral or written and will take approximately 30 minutes. <u>No Subcontractor personnel will be permitted to work without having received this basic indoctrination.</u>

2. If basic indoctrination is unavailable at the time of need, the Contractor will provide escorts until an indoctrination session can be coordinated.

3. Indoctrination requirements will not apply to routine delivery men who will be escorted while on site by Contractor personnel.

C. <u>Smoking, Drinking, Eating and Chewing Restrictions</u>

No smoking will be permitted in the immediate vicinity of any flammable liquids, gases or highly combustible material, or in any plant area posted as a non-smoking area. No smoking, eating or chewing will be permitted in any controlled area. Drinking within controlled areas is allowed only after hands are washed and frisked with appropriate radiation detection instrumentation.

SC-11 <u>HEALTH PHYSICS</u>

All work performed under this subcontract shall conform to the Construction Safety & Health Management Program-SEC XIII, SEC XIV, SEC XV.

The Subcontract work area (is located/is not located) within a radiologically controlled area. The Contractor will provide formal radiation training (2 hours in duration) and dosimetry requirements of bioassay and TLD prior to commencement of the work.

A. Work Conditions

1. Some areas beyond the control point have special Health Physics restrictions. These are controlled by ribbons, signs, and tags. Such restrictions shall be observed by the Subcontractor and applicable precautions taken.

2. Radiation exposure on this subcontracting effort will be maintained well within allowable radiation exposures.

3. Personnel protection equipment: The level of protection could require coveralls, cotton gloves, and rubber over boots. These items will be provided by the Contractor unless otherwise specified.

4. Personnel Monitoring: All personnel will be monitored for radioactive contamination upon leaving any radiologically controlled area. Personnel will be instructed in self-monitoring procedures if necessary.

5. Vehicle, Tool and Equipment Monitoring: All vehicles, tools, & equipment, used inside a controlled area will be monitored for radioactive contamination by ES&H personnel before leaving the area.

6. ES&H Monitoring: The ES&H personnel will provide radiological surveillance over work activities and advise the Subcontractor on matters concerning radiation safety.

B. Warning Signals: In emergency cases, the Subcontractor may depend on direct verbal information from the Contractor's personnel for warning signals. The Subcontractor's foreman and employees shall take action as directed. The Subcontractor's representative shall obtain the name, position, and agency of the messenger providing such direction.

C. Disposition of Contaminated Equipment, Tools and Material:

1. The Subcontractor shall use his own equipment in performing the required work under this Subcontract. All tools, vehicles, equipment and material will be inspected for radioactive contamination by Contractor personnel prior to removal from the construction area. Site experience has shown that no decontamination problems have occurred.

2. Should the Subcontractor's tools, material, or equipment become contaminated, they will have to be decontaminated before removal from the area. If decontamination becomes necessary, the Contractor will provide instructions for decontamination which may consist of steam cleaning, dry brushing, or washing with appropriate liquids. Decontamination required beyond these described will be handled under Article 59, "CHANGES" of the General Provisions.

3. If decontamination proves impracticable or impossible, the tools, material, or equipment in question will be retained and an equitable adjustment of the value of the equipment for same will be negotiated with the Subcontractor provided that:

   a. There is no fault or negligence of the Subcontractor contributing to the contamination;

   b. The Subcontractor has followed all the specific instructions of the authorized HP personnel who have surveillance over the worker;

   c. Item or equipment confiscated from the Subcontractor is documented by a Confiscation Notice furnished to the Subcontract Administrator by the Contractor and signed by HP personnel and the Operations Manager or his designee.

d. The Subcontractor allows reasonable time (a maximum of five (5) working days, excluding weekends and holidays) in which to attempt decontamination of the item(s) in question.

4. If reimbursement is required for tools, material or equipment, the following compensation will be made:

   a. Tools valued less than $300.00: 95% of replacement cost.

   b. Tools/equipment $300.00 and up: If less than one (1) year old or at top of depreciation schedule, at 75% of replacement cost; if at bottom of or off the depreciation schedule, at 50% of replacement cost.

SC-12 <u>TEMPORARY HEAT AND COLD WEATHER ENCLOSURES</u>

A. Temporary heating if needed shall be conducted in strict accordance with the applicable section of the Construction Safety and Health Management Program. The Subcontractor shall provide all temporary heat and/or heating equipment required for his use. The Subcontractor shall provide a watchman to check the heater when they are in operation and construction crews are not working at the job site. The use of open-type or oilpot salamanders, and gasoline-fueled heaters is prohibited. All products of combustion-type heaters shall be directly vented to the exterior of the structure and/or temporary enclosure.

SC-13 <u>PARKING FACILITIES</u>

A. Construction personnel shall park their vehicles in the designated parking area.

SC-14 <u>EATING FACILITIES</u>

A. No lunch room or cafeteria facilities are available.

SC-15 DAILY REPORT

A. The Subcontractor shall submit a daily report to the Operations Department stating the following information:

1. Work Accomplished
2. Manpower
3. Equipment
4. Problems or delays

SC-16 INSURANCE (Reference GP-33)

A. Subcontractor shall procure and maintain, during the period that this order remains in force, insurance coverages and limits of not less than those set forth in this agreement. Subcontractor will require all insurance companies issuing policies of insurance for Subcontractor, to certify to the Contractor in writing prior to commencement of any work, that such policies have been issued and are currently in effect.

Subcontractor agrees to waive any subrogation rights against Contractor.

Policies issued for Subcontractor shall be endorsed to include the following for the benefit of the Contractor.

* A 30 day advance written notice in the event of cancellation, non-renewal or material change of any policy.

* Contractor named as Additional Insured, as interests appear (Coverage B below).

* Subcontractor's insurance is primary and any insurance maintained by Contractor is excess and non-contributory.

* Cross liability or severability of interest clause (liability policies only).

INSURANCE COVERAGES

Type of Coverage: A

Worker's Compensation and, where an exposure exists Federal Employees Liability Act, U.S.

Longshoremen & Harbor Workers', Jones Act and Employer's Liability.

Policy Limits:

State and Federal Acts - Statutory
Employer's Liability - $1,000,000

Type of Coverage: B

Comprehensive General Liability including coverages for Independent Contractors, Products and Completed Operations (extending for at least 24 months after completion of operations) Blanket or Broad Form Contractual, Personal Injury Liability, Broad Form Property Damage, and where an exposure exists and explosion, collapse and underground (XCU) hazard exclusions deleted.

Policy Limits:

$1,000,000 each occurrence Bodily Injury.

$500,000 each occurrence Property Damage: or $1,000,000 Combined Single Limit.

Type of Coverage: C

Comprehensive Automobile Liability including coverage for owned, non-owned and hired vehicles.

Policy Limits:

$500,000 each person/$1,000,000 each occurrence.

Bodily Injury/$500,000 each occurrence Property Damage: Or $1,000,000 Combined Single Limit.

B. In the event any work to be performed under this subcontract is sublet, the Subcontractor will require the same insurance coverage and limits from its lower tier Subcontractors or suppliers and will require said lower tier Subcontractors or suppliers to certify insurance coverage to the Contractor prior to the commencement of any sale or work.

C. If Subcontractor shall fail to certify required insurance coverage to the Contractor as set forth above, before commencing work hereunder the Contractor may, at its option, place insurance of the character, nature and limits described above to cover the operations of the Subcontractor, paying the premiums for same and charging same to the Subcontractor.

D. The Contractor, by requiring the foregoing minimum insurance coverages, will not be deemed to limit any of the other obligations or liabilities of the Subcontractor, deductibles if any, will be solely for the account of the Subcontractor.

E. Should Contractor require additional insurance subsequent to the acceptance of this subcontract by Subcontractor, the net cost thereof shall be an addition to the Subcontract price. Such request must be made in writing to Subcontractor.

F. Notwithstanding any trade practice or custom, neither the Subcontractor nor any lower tier subcontractor or supplier shall be entitled to the benefit of any insurance Contractor or its Customer have in effect of which either might have obtained.

SC-17 QUALITY ASSURANCE

All work performed under this Subcontract shall conform to the requirements of the Contractor's Quality Assurance Program Plan. The Subcontractors work will be subject to inspection and Quality Assurance audits by the Contractor.

A copy of the Quality Assurance Program Plan is available upon request from the contractor's office at the Weldon Spring Site.

SC-18 VARIATIONS IN QUANTITIES

In all cases (except cancellation of one (1) or more line items) where the quantity of a unit priced line item in the subcontract is an estimated quantity, and where the actual quantity of such line item varies by more than 10% above or 10% below the originally estimated quantity stated in the subcontract, any adjustment in the unit rate shall be negotiated upon demand of either party for the quantities above or below the stated variation.

The adjustment shall be based on any increase or decrease in cost due solely to the variation above or below the originally estimated quantities.

SC-19 SUPERINTENDENCE BY SUBCONTRACTOR

A. SEE GP-46 For General Requirements

B. In accordance with Article GP-46, a (full-time working) (full-time non-working) supervisor shall be required.

SC-20 DISPOSITION OF REMOVED EQUIPMENT, MATERIAL, AND SCRAP METAL

All material or equipment removed from any existing system (plant site or quarry), or structure, shall be transported to a storage location as specified by the Construction Engineer, and turned over to MK-F for disposition for the Government.

All potentially reusable material or equipment shall be properly identified, tagged, and checked for contamination before transporting to a storage location identified by the Construction Engineer.

SC-21 SCHEDULE/SCHEDULE OF VALUES

A. SEE GC-6 For General Requirements

B. In General, schedule items should be limited to approximately __ weeks duration and limited to approximately __ percent of the total project value.

SC-22 DISPOSITION OF EXCAVATED SOIL

A. Excess Soil

Soil removed during excavation that is needed for backfill shall be stockpiled to allow the Contractor and others free and clear access (including road access) to all existing buildings and other operating facilities. In those cases where the stacking of soil near the excavation would restrict vehicle traffic or prohibit access to the buildings and operating facilities, or create congestion of the work area, the Subcontractor shall temporarily stockpile the soil in an area identified by the Construction Engineer away from the excavation until backfill operations are designated. All excess soil removed from excavations (soil displaced in excess of that needed for backfill) shall be disposed of as directed by the Construction Engineer. All soil to be removed to the disposal site shall be free of non-soil materials such as concrete, wood, asphalt, metal, plastic, etc.

B. Radioactively Contaminated Soil

Radioactively contaminated soil (will/will not) be encountered during excavations required for this Subcontract. Disposal of said soil shall be at the direction of the Construction Engineer.

SC-23 TRAINING AND INDUSTRIAL HYGIENE (Clause 1)

A. Training Requirements

1. All personnel who will work in access controlled areas of this site must have undergone a health and safety training program in accordance with 29 CFR 1910.120. This training shall include appropriate respiratory protection training. The training shall be provided by the Subcontractor for its own personnel. Supervisory personnel shall receive additional training in health and safety in accordance with the same regulation.

2. Documentation of completion of this training must be provided to the PMC prior to or upon the arrival of each employee at the site. This documentation must consist of, at a minimum, the dates of training, a description of the contents of the course, a copy of a letter or certificate signed by the person conducting the training course and any additional supporting information which the PMC may deem necessary. Personnel will not be allowed unescorted entry to the site until this documentation is received.

3. The Subcontractor shall provide additional training which addresses the major hazards at the WSS. The Health and Safety Guidebook to the Weldon Spring Site included with this Request for Proposal provides information on the known hazards at this site and their locations.

4. Once at the site, the PMC shall provide information and training on the known hazards at this site. This training will be included as a part of the initial orientation training session described in SC-11, Health Physics.

B. Medical Surveillance

1. All Subcontractor personnel working in access controlled areas of the Weldon Spring site meeting any of the following criteria shall participate in a medical surveillance program:

   a. Personnel who are or are likely to be exposed to air contaminants in excess of the OSHA permissible exposure limits for 30 or more days per year.

   b. Personnel who are or are likely to be exposed to asbestos fibers in excess of the OSHA action level for 30 or more days per year.

   c. Personnel who will be required to wear respiratory protection.

   This program shall be designed, at a minimum, to detect the effects of exposure to the major hazards listed below.

2. The medical surveillance program shall at a minimum include a baseline physical examination and an exit physical examination.

   a. For the baseline physical examination, the Subcontractor shall provide documentation concerning the fitness of each employee to work at a hazardous waste site at which the major hazards listed below are present. Where applicable, this shall include documentation that the employee is fit to wear a respirator and other required personal protective equipment. The above documentation must be received by the PMC upon arrival of the employee at the site. Documentation meeting the above criteria will be acceptable for physical examinations conducted up to three (3) months prior to the start of work at site.

b. Exit physical examination shall be conducted within two (2) weeks of the employee's last day of work at the site. Documentation of the exit physical examination, including a copy of the written opinion from the examining physician, relative to occupational exposure, shall be submitted to the PMC within two (2) weeks of the examination.

C. <u>Work Conditions</u>

1. Portions of the controlled access area in which this Subcontract is to be performed are known to be contaminated with the following materials:

   Asbestos
   Uranium
   Chlorodiphenyls (PCBs)
   Nitroaromatics (TNT, 2,6-DNT, etc.)
   Mercury

   The Subcontractor is responsible for providing adequate equipment and procedures for controlling exposure of its personnel to these materials and for controlling the spread of these materials from its work area to other areas of the site. The Subcontractor shall be responsible for maintaining exposure levels below the established OSHA exposure limits specified in 29CFR 1926, Subpart D and 29CFR 1910, Subpart Z, as applicable.

2. Known contaminated areas and health hazards are posted by the PMC. Subcontractor personnel shall obey posted warnings.

3. Any health hazard(s) created by the Subcontractor shall be posted by the Subcontractor. The PMC shall be notified immediately of all such hazards.

4. Personal protection or engineering control equipment appropriate to the potential hazards to which personnel performing the work under this Subcontract shall be provided by the Subcontractor.

5. A heat stress hazard may exist at this site due to the warm, humid climate, the personal protective equipment requirements and the prohibition on eating and drinking in certain areas of the site. The Subcontractor is responsible for providing a heat stress management program for its personnel.

6. Biological hazards in the form of poison ivy, snakes, ticks, mosquitoes, and high airborne mold concentrations have been noted at this site.

SC-23 <u>TRAINING AND INDUSTRIAL HYGIENE</u> (Clause 2)

A. <u>Training Requirements</u>

1. Subcontractor personnel who will work in access controlled access areas of this site must have undergone a health and safety training program in accordance with 29 CFR 1910.120. This

training shall include appropriate respiratory protection training. The training shall be provided by the Subcontractor for its own personnel. Supervisory personnel shall receive additional training in health and safety in accordance with the same regulation.

2. Documentation of completion of this training must be provided to the PMC prior to or upon the arrival of each employee at the site. This documentation must consist of, at a minimum, the dates of training, a description of the contents of the course, a copy of a letter or certificate signed by the person conducting the training course and any additional supporting information which the PMC may deem necessary. Personnel will not be allowed unescorted entry to the site until this documentation is received.

3. The Subcontractor shall provide additional training which addresses the major hazards at the WSS. The <u>Health and Safety Guidebook to the Weldon Spring Site</u>included with this Request for Proposal provides information on the known hazards at this site and their locations.

4. Once at the site, the PMC shall provide information and training on the known hazards at this site. This training will be included as a part of the initial orientation training session described in SC-11, Health Physics.

B. <u>Work Conditions</u>

1. Portions of the controlled access area in which this Subcontract is to be performed are known to be contaminated with the following materials:

   Asbestos
   Uranium
   Chlorodiphenyls (PCBs)
   Nitroaromatics (TNT, 2,6-DNT, etc.)
   Mercury

The Subcontractor is responsible for providing adequate equipment and procedures for controlling exposure of its personnel to these materials and for controlling the spread of these materials from its work area to other areas of the site.

The Subcontractor shall be responsible for maintaining exposure levels below the established OSHA exposure limits specified in 29CFR 1926, Subpart D and 29CFR 1910, Subpart Z, as applicable.

2. Known contaminated areas and health hazards are posted by the PMC. Subcontractor personnel shall obey posted warnings.

3. Any health hazard(s) created by the Subcontractor shall be posted by the Subcontractor. The PMC shall be notified immediately of all such hazards.

4. Personal protection or engineering control equipment appropriate to the potential hazards to which personnel performing the work under this Subcontract shall be provided by the Subcontractor.

5. A heat stress hazard may exist at this site due to the warm, humid climate, the personal protective equipment requirements and the prohibition on eating and drinking in certain areas of the site. The Subcontractor is responsible for providing a heat stress management program for its personnel.

6. Biological hazards in the form of poison ivy, snakes, ticks, mosquitoes, and high airborne mold concentrations have been noted at this site.

SC-23 <u>TRAINING AND INDUSTRIAL HYGIENE</u> (Clause 3)

A. <u>Training Requirements</u>

1. Once at the site, the PMC shall provide information and training on the known hazards at this site. This training will be included as a part of the initial orientation training session described in SC-11, Health Physics.

B. <u>Work Conditions</u>

1. Portions of the controlled access area in which this Subcontract is to be performed are known to be contaminated with the following materials:

   Asbestos
   Uranium
   Chlorodiphenyls (PCBs)
   Nitroaromatics (TNT, 2,6-DNT, etc.)
   Mercury

   The Subcontractor is responsible for providing adequate equipment and procedures for controlling exposure of its personnel to these materials and for controlling the spread of these materials from its work area to other areas of the site.

   The Subcontractor shall be responsible for maintaining exposure levels below the established OSHA exposure limits specified in 29CFR 1926, Subpart D and 29CFR 1910, Subpart Z, as applicable.

2. Known contaminated areas and health hazards are posted by the PMC. Subcontractor personnel shall obey posted warnings.

3. Any health hazards(s) created by the Subcontractor shall be posted by the Subcontractor. The PMC shall be notified immediately of all such hazards.

4. Personal protection or engineering control equipment appropriate to the potential hazards to which personnel performing the work under this Subcontract shall be provided by the Subcontractor.

5. A heat stress hazard may exist at this site due to the warm, humid climate, the personal protective equipment requirements and the prohibition on eating and drinking in certain areas of the site. The Subcontractor is responsible for providing a heat stress management program for its personnel.

6. Biological hazards in the form of poison ivy, snakes, ticks, mosquitoes, and high airborne mold concentrations have been noted at this site.

SC-24 <u>THE IMMIGRATION AND CONTROL ACT OF 1986; PL-99603</u>

The Subcontractor shall be responsible for implementation and compliance with all applicable provisions of the Federal Immigration and Naturalization Act of 1986 which are incorporated herein by reference and made a part of the duties of the Subcontractor under this subcontract.

MKE DOCUMENT NO. 5121-C.DW-D-01-0117-00

U. S. DEPARTMENT OF ENERGY

OAK RIDGE, TENNESSEE

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ECTED	
OMMENDED	

CHEMICAL PLANT
CONSTRUCTION DRAWINGS

TITLE SHEET

ROVED	DATE	CHIEF ENG./QA MGR.	DATE	PMC ENG'G MGR.	DATE	DOE PROJ. ENG.	
	4-1-87		4/1/87				

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON-KNUDSEN COMPANY
WSSRA PROJECT
180 HOWARD ST. SAN FRANCISCO, CA 94105

PROJECT NO. DE-AC05-86OR2[illegible]

DRAWING NO. 5121E-0[illegible]

[illegible] OVERHEAD PIPING & SUPPORT REMOV[illegible]

200 0 200 400

SCALE FEET

MKE DOCUMENT NO. 5121 - C : DW - D - 01 - 0119 - 00

U. S. DEPARTMENT OF ENERGY

OAK RIDGE, TENNESSEE

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[illegible]ECTED	
[illegible]MMENDED	

CHEMICAL PLANT
CONSTRUCTION DRAWINGS

EXISTING SITE PLAN

[illegible]ROVED DATE	CHIEF ENG /QA MGR DATE	PMC ENG'G MGR DATE	DOE PROJ ENG
	3 Apr 87		

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY
WSSRA PROJECT
180 HOWARD ST. SAN FRANCISCO, CA 94105

PROJECT NO. DE-AC05-86OR21[illegible]

DRAWING NO. 5121E-CP-533

CT - OVERHEAD PIPING & SUPPORT [illegible]

IRA-500-504

cc: D. R. Lewis
R. A. Nelson
A. J. Stewart

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

3589-87-I-EPA-010

NOV 5 1987

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Electric Power and Pole Removal,
- Overhead Piping/Asbestos Removal,
- Cleanup of Vicinity Property No. 7 on the Army Reserve Area, and
- Disposal of Containerized Chemicals.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

FILE NUMBER: ____________

001812
11-6-87

We will provide any comments on these within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay
Regional Administrator

cc: Dr. Fred Brunner, MDNR

bc: Robert Morby
Dan Shiel
Rowena Michaels
Ron Ritter

4711

NOV 10 1987

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of October 8, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: D. Bedan, MDNR
E. Brown, FLW
w/enclosure

FILE NUM

FILE NUMB

PEER:JCoyne:x41:mw:11/8/87 (...IRACom.Ltr.)
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DOE F 1325.10
(7-79)

CONCURRENCE
RTG SYMBOL PEER
INITIALS/SIG. J. Coy
DATE 11/9/
RTG SYMBOL CE-541
INITIALS/SIG. R. Nel
DATE 11/9/
RTG SYMBOL
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RESPONSES TO USEPA REVIEW COMMENTS
ON IRA PACKAGES

Cleanup of Vicinity Property No. 7, Army Reserve Area

Comment: The proposal to cleanup this vicinity property calls for excavating the contaminated area to a depth of six (6) inches or where the radium concentration is below 15 pCi/g and then backfilling with clean material. The EPA suggests that while its criteria for residual radium in soil is satisfied by this approach, that we consider removing additional soil to reduce the concentration to below 5 pCi/g. As the area is small, little additional excavation would be required.

Response: Subsequent to the preparation of the IRA package for Army Reserve Vicinity Property #7, the Deparment of Army requested that the area not be backfilled upon completion of the cleanup as proposed by the DOE. The DOE will leave the excavation area open and apply the suface criteria of 5 pCi/g to this particular vicinity property.

Disposal of Containerized Chemicals

Comment: It is suggested that the specifications for this work might be strengthened by adding waste characterization procedures into Section 2.0 (Scope) of the document. The procedures are those which may be required under 40 CFR 260-268, or others required by the permit held by the Treatment, Storage and/or Disposal Facility.

Response: Procedures required in 40 CFR 260-268 will be referenced in Section 2.0 of the Request for Proposal. In addition, it will be emphasized that all waste characterization procedures which are required by the successful bidder's treatment, storage and/or disposal facilities permit must be satisfied. It will be required that these procedures (if applicable) be presented in the subcontractor's work plan.

Comment: EPA recommends that the specific subcontractor qualifications and experience in handling known and unknown potentially hazardous wastes be defined in the document.

Response: We are in agreement with the EPA that the Request for Proposal should contain subcontractor qualifications and experience clauses. The appropriate clauses will be added to the document.

Comment: The EPA recommends that the specification require the successful bidder to identify the specific waste disposal facilities which will accept the containerized chemical waste, in the work plan phase.

Response: The specification will be modified to include provision for certification by the subcontractor that the waste disposal facilities meet the requirements when hazardous wastes are involved. The land disposal ban provision of RCRA will also be addressed as part of the subcontractor's work plan.

General

Comment: The EPA review states that there is one(1) deficiency common to the four proposals and that is that plans for onsite handling and storage of radioactive contaminated materials should be developed.

Response: Plans for onsite handling and storage of radioactive contaminated materials are currently being finalized and will be provided under separate cover.

4711

NOV 10 1987

CONCURRENCES	
RTG SYMBOL	PEER
INITIALS/SIG.	J. Coyn
DATE	11/9/8
RTG SYMBOL	CE-541
INITIALS/SIG.	R. Nels
DATE	11/9/8
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Mr. David E. Bedan
Missouri Department of
Natural Resources
Post Office Box 176
Jefferson City, Missouri 65102

Dear Mr. Bedan:

MISSOURI DNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in Dr. Frederick A. Brunner's letter of October 26, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised and we intend to proceed with these actions in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: B. K. Biggs, USEPA
E. Brown, FLW
w/enclosure

FILE NUMBER:

PEER:JCoyne:x41:mw:11/9/87: (c:DNRCom.Ltr.)

DOE F 1325.10
(7-79)

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RESPONSES TO MDNR COMMENTS
ON INITIAL FOUR (4) IRA PROPOSAL PACKAGES

I. <u>Removal of Overhead Piping and Asbestos Removal</u>

Comment: The DNR states that Missouri has adopted the Federal Clean Air Act standards for asbestos handling and has been delegated responsibility for implementing these standards and that asbestos and piping removal activities are subject to both the Missouri Air Conservation Law and the Missouri Solid Waste Management Law. DNR recommends that we maintain close contact with the Air Pollution Control Program to insure compliance with these standards.

Response: DNR Air Pollution Control Program office will be kept apprised of plans for asbestos removal work at the Weldon Spring Site. The WSSRAP will comply with requirements for disposal of asbestos and other demolition wastes in accordance with the Missouri Solid Waste Management Act.

Comment: The DNR has determined that the overhead piping and asbestos should be handled as a "special waste".

Response: We are proceeding to include the Special Waste Disposal Request form in the Request for Proposal for this work.

Comment: The DNR states that onsite handling of asbestos and other demolition waste <u>may</u> also be subject to Missouri Solid Waste Management Law requirements and requests that we furnish information on the size, design, location of the staging area and the amounts and methods of handling for the materials to be handled in the materials staging area.

Response: Information on handling and staging of the materials will be furnished to the DNR prior to issuing requests for proposals for this work.

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II. Disposal of Containerized Chemicals

Comment: Define specific levels at which the containerized wastes are considered radioactive.

Response: WSSRAP is developing concentration levels for wastes containing natural uranium for review and acceptance by concerned federal agencies. We will advise the DNR of this determination as it comes available. Until this determination is made we will retain on site containerized chemical materials which contain detectable levels of radioactive materials as determined by our onsite instruments.

Comment: What are removal plans for underground storage tanks on site?

Response: The underground tanks at the WSS have been sampled and found to contain only rainwater with trace amounts of motor fuel. The drainage and removal of the underground tanks is not part of the containerized chemical inventory and removal IRA Scope of Work. They may be removed as part of a subsequent IRA.

Comment: The document appears to be a generic outline for removal of waste. Items such as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. are not detailed.

Response: The IRA documentation represents a request for proposal to be sent to potential removal subcontractors. The responsibility for developing a detailed work plan addressing such items as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. rests with the successful bidder. A requirement of the subcontract specification is the development of the subcontractor's work plan which must be approved by the WSSRAP before the work may begin. The DNR will be provided a copy of the subcontractor work plan when it becomes available for review. The WSSRAP office requests that the State provide a timely review (14 calendar days) to avoid delaying the subcontractor's

efforts. The State will be given 2-weeks notice of the interval at which time the work plan will be available for review.

III. Remedial Action on Army Vicinity Property

Comment: DNR states that the interim measure suggested is lacking in detail and should contain information on:

- How the removal is to be conducted?
- How and where excavated material will be contained?
- Health and safety plans for the work.
- Why is DOE recommending only remedial action for this vicinity property?
- When does DOE plan to remove the additional contamination in the other six locations?

Response: The technical requirements, i.e. specifications, drawings, special conditions, etc., did not accompany this IRA package for review as they were incomplete at the time of package submittal. Requirements for removal, containment and storage, and health and safety plans will be included in the Request for Proposal for this work.

The very small quantity (less than two cubic yards) of contaminated material can be removed manually and will not require any significant mechanical equipment. The technical specification developed for this work will provide required direction to the subcontractor.

We plan to excavate and place the contaminated soil in 55 gallon drums. The drums will be sealed, placed and stored in a dry, concrete floored building at the Weldon Spring Site awaiting final disposition. Total volume is anticipated to be less than 5 drums.

No unusual hazards are anticipated for this activity. The contract will require workers to abide by the WSSRAP Environmental, Safety and Health Plan.

DOE proposes performing remedial action of Army Vicinity Property No. 7 to remove contamination from an area where the Army has imminent construction plans. Cleanup of other vicinity properties, containing larger volumes of contaminated material, will be recommended based upon urgency of cleanup needs and development of storage facilities on the WSS.

Remediation of the remaining Army Vicinity Properties is tentatively scheduled for the first and second quarters of fiscal 1989.

IV. Power Line/Pole Removal

Response: The plan should address PCB contamination in regard to pole removal if transformers/capacitors containing PCB's were mounted on them.

Comment: The power poles to be removed in the IRA were specifically not associated with transformers containing PCBs. Those poles which have oil-cooled transformers mounted on them will be surveyed and removed at a later date.

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IRA-500-505

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

November 3, 1989

Mr. Gale Wright, Chief
Remedial Section/Superfund Branch
U. S. Environmental Protection
  Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Mr. Wright:

MODIFICATION TO THE CONTAINERIZED CHEMICALS ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

The original containerized chemicals Engineering Evaluation/Cost Analysis (EE/CA) package stated that the RCRA waste, which could not be released off site, would be stored in Building 406. Since that time, it has been determined that a larger storage area is needed. Therefore, the purpose of this letter is to amend the EE/CA to show that the RCRA waste will be stored in Building 434.

Building 434 is undergoing modifications to meet RCRA storage requirements. Modifications should be completed by the end of 1989 and at that time, the contents of Building 406 will be moved.

This letter is to advise you of the modification to the containerized chemicals EE/CA. Please contact Ken Lawver if you have any questions.

Sincerely,

K. L. Lawver

For Stephen H. McCracken
Acting Project Manager
Weldon Spring Site
Remedial Action Project

cc: Dave Bedan, MDNR

FILE NUMBER: ______________

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

May 7, 1990

Mr. Dan Wall
Remedial Project Manager
U. S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Mr. Wall:

RCRA COMPLIANCE FOR CONTAINERIZED CHEMICALS

In carrying out the Containerized Chemical Interim Response Action, we have found a disconnect between the requirements of RCRA (both State and EPA) and what we consider to be best conduct of operations for expediting secure storage of chemicals.

The enclosed flow chart illustrates the sequence of activities for collecting, sampling, repackaging and storing potentially hazardous chemicals at the site. Basically, the concept is to move chemicals that we find into the RCRA storage area as quickly as possible. To accomplish this we do a gross field analysis; move the material into the RCRA storage area; and then we do a detailed chemical analysis as required in order to fully meet the requirements of 40 CFR 264.13 and 10 CSR 25.5.262 (2) (c). These regulations require, however, that the detailed analysis be performed prior to placing the material in the RCRA storage area and that the containers be properly labeled during the entire storage period. Therefore, there is a period of time that we are in non-compliance. We do label all containers based on all information currently available and the containers will be relabeled as the detailed chemical analyses becomes available. For the most part, all required information for labeling is provided by the gross field analyses. In addition, all chemical waste is being packaged in DOT-approved containers regardless of its RCRA standing.

It is our belief that the approach we have adopted is preferable to leaving chemicals in an "as is" condition until detailed analysis is performed. I understand that this issue has been discussed with Dan Wall and Joe Davis and this letter is to solicit concurrence.

FILE NUMBER: ____________

If you have any questions please give me or Ken Lawver a call.

Sincerely,

Stephen H. McCracken
Project Manager
Weldon Spring Site
Remedial Action Project

cc: Joe Davis, MDNR
R. E. Hlavacek, PMC
Peter Gross, SE-31

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

May 7, 1990

Mr. David E. Bedan
Missouri Department of Natural Resources
205 Jefferson St.
Jefferson State Office Bldg., 12th Floor
P.O. Box 176
Jefferson City, MO 65102

Dear Mr. Bedan:

RCRA COMPLIANCE FOR CONTAINERIZED CHEMICALS

In carrying out the Containerized Chemical Interim Response Action, we have found a disconnect between the requirements of RCRA (both State and EPA) and what we consider to be best conduct of operations for expediting secure storage of chemicals.

The enclosed flow chart illustrates the sequence of activities for collecting, sampling, repackaging and storing potentially hazardous chemicals at the site. Basically, the concept is to move chemicals that we find into the RCRA storage area as quickly as possible. To accomplish this we do a gross field analysis; move the material into the RCRA storage area; and then we do a detailed chemical analysis as required in order to fully meet the requirements of 40 CFR 264.13 and 10 CSR 25.5.262 (2) (c). These regulations require, however, that the detailed analysis be performed prior to placing the material in the RCRA storage area and that the containers be properly labeled during the entire storage period. Therefore, there is a period of time that we are in non-compliance. We do label all containers based on all information currently available and the containers will be relabeled as the detailed chemical analyses becomes available. For the most part, all required information for labeling is provided by the gross field analyses. In addition, all chemical waste is being packaged in DOT-approved containers regardless of its RCRA standing.

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If you have any questions please give me or Ken Lawver a call.

Sincerely,

S H McCracken

Stephen H. McCracken
Project Manager
Weldon Spring Site
Remedial Action Project

cc: Joe Davis, MDNR
R. E. Hlavacek, PMC
Peter Gross, SE-31

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE ARFS FILE # IR-0600

TABLE OF CONTENTS

The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-600-601

IRA-600-602

IRA-600-603

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

September 03, 1987

Ms. Katherine Biggs
United States Environmental
Protection Agency, Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

Enclosed is the information regarding the removal of abandoned power lines and poles from the Weldon Spring Site, which we discussed in our telephone conference on July 24, 1987.

The site contains about 150,000 linear feet of electrical and communications wire and cable and 300 timber utility poles. Many of these poles are rotten and several have fallen during the past year. They present a safety hazard to site personnel.

We propose to remove the lines and poles. These will be disposed of off site. However, any radiologically contaminated material will be retained on site as described in the enclosed material. The work will be accomplished by a subcontractor to MK-Ferguson Company, our Project Management Contractor.

The enclosed index lists five (5) attachments including sampling information and drawings and specifications. If you have any questions please contact Jim Coyne of PEER Consultants, our support services contractor at (314) 441-8472.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR

DOCUMENT NUMBER: I-600-601-1.01

LIST OF ATTACHMENTS

Attachment 1

- Interim Measure - Electrical Line and Pole Removal - Summary

Attachment 2

- Specifications for Electric Power and Pole Removal

Attachment 3

- Special Conditions - Electrical Power and Pole Removal

Attachment 4

- Drawings - Chemical Plant Electrical Lines and Pole Removal

Attachment 5

- Radiological Survey of Chemical Plant Electrical Poles

Note - See also Addendum No. 1 dated 8/27/87

Attachment No. 1

INTERIM MEASURE

ELECTRICAL LINE AND POLE REMOVAL

SUMMARY

This task consists of removing abandoned power line and support poles at the Weldon Spring Site. About 300 timber utility poles and 150,000 lf of electrical and communications cable and wire are involved.

We propose to do this work now to improve safety conditions at the site. Many poles are rotted at ground level and pose a potential hazard to personnel working in the chemical plant area. In fact, a number of poles have failed and fallen during the past year.

Surveys of utility poles (see Attachment No. 5) show levels of contamination, where present, to be well within limits acceptable for release of these materials from the site. The plan (see Attachment No. 2) calls for survey of the poles and lines to verify they are uncontaminated immediately prior to release. Any poles found contaminated will be segregated and stored for later disposal. We expect these materials to be releasable. Should we find during removal that a pole or section thereof is contaminated above release levels we plan to leave that pole or portion thereof in place until we have constructed a suitable on-site interim storage area. Contamination, if present, is expected to occur at or near ground level on the poles. Thus, cutting those poles off above ground level would alleviate the immediate safety hazard. The butt end could remain in-situ for later removal.

DOCUMENT NUMBER: I-600-601-1.02

elpratt.txt

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

SET I.D. ______

WSSRA PROJECT REVIEWS AND APPROVALS

Subject: WSSRA PROJECT - CP
Specification Section 02053
Demolition of Electrical Line
and Poles

5121-C:SP-S-01-0190-~~02~~ 03

(DOCUMENT NO.)

	Signature	Date
Prepared:	J Eaves	8-21-87
Reviewed:	DW Reppond	8-21-87
Approved, MKE:		
- Lead Design Engineer	DW Reppond	8-21-87
- Design Manager	J L Jordan	21 Aug 87
- Vice President, ESci Division		

QA Compliance ______

Approved:		
- PMC Engineering Manager	D K Lewis	9/28/87

Q.A. REVIEW
ENTRY NO. N/A
INIT. [illegible] DATE 11/30/87

FILE NUMBER: ______

4549G/0137G

02/87

SECTION 02053

DEMOLITION OF ELECTRICAL LINES AND POLES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This Section describes the requirements for the removal of existing timber poles, and above-ground electrical, power, and communications lines at a uranium feed materials processing plant as located on the Subcontract Drawings. 3

B. Transformers and substations will be removed by others.

1.2 DEFINITIONS

Utility: For the purpose of this Section, above ground utility means any service such as electric power systems, lighting systems, telephone, and associated support structures.

1.3 JOBSITE CONDITONS

See Special Conditions for restrictions applicable to work in areas of potential radiation hazard. 3

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. Removal of the utility shall not be undertaken until written approval for such work has been obtained from the Contractor.

FILE NUMBER

Q.A. REVIEW
ENTRY NO. N/A
INIT. [signature] DATE 1/13/87

B. Except for the utility lines shown to remain, all on-site above-ground electric power, lighting, and communication lines shall be removed, together with all poles and supporting structures. Conduit and cable risers on poles shall be cut off at ground level. Poles, grounding rods and guy wire anchors shall be pulled and the voids filled to the ground surface with tamped earth. Acceptable backfill material is available on site. Relocation of lines, if required, will be performed by others.

C. To assure uninterrupted service to off-site customers, the Subcontractor shall obtain approval from the affected utility companies before disturbing utilities. Utilities shall be protected from damage by demolition operations until they are removed from service.

D. Although Contractor intends to de-energize all wire to be removed, Subcontractor shall verify that all electrical items within Subcontractor's Scope of Work are de-energized prior to commencing work.

E. Backfilled holes and unpaved areas disturbed by demolition operations shall be seeded as specified in Section 02930.

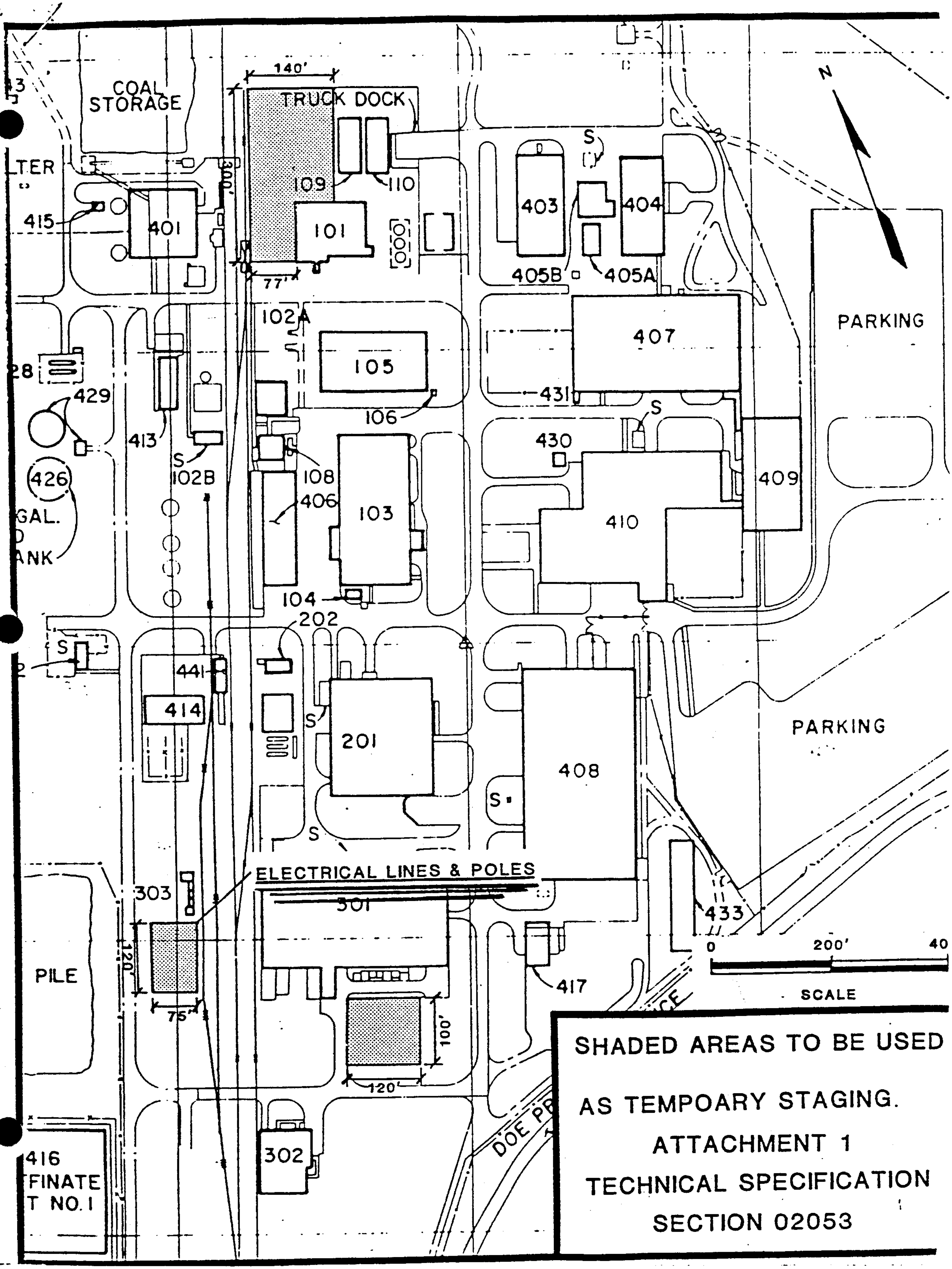
3.2 DISPOSAL OF DEMOLITION DEBRIS

A. All materials will be subject to classification by the Contractor. The materials will be classified as contaminated and uncontaminated. No contaminated material is expected; however, any contaminated material, if encountered and so classified, shall be stacked in the on-site storage area shown on Figure 02053-1. Uncontaminated material shall be disposed of off-site. 3

B. After a pole is pulled, the lower part of the pole shall be further checked and classified with regard to contamination. Where a pole is removed from a location where the soil is found to be contaminated, the pole shall be cut off two feet above ground contact level. 3

END OF SECTION 02053

FILE NUMBER: ____________



SHADED AREAS TO BE USED

AS TEMPOARY STAGING.

ATTACHMENT 1

TECHNICAL SPECIFICATION

SECTION 02053

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON-KNUDSEN COMPANY

SET I.D. ______

WSSRA PROJECT REVIEWS AND APPROVALS

Subject: WSSRA PROJECT - CP
Specification Section 02930
Seeding

5121-C:SP-S-01-0306-00
(DOCUMENT NO.)

	Signature	Date
Prepared:	AW Reppond	4/3/87
Reviewed:	[illegible]	4/3/87
Approved, MKE:		
- Site Design Engineer	AW Reppond	4-3-87
- Engineering & Design Manager	Philip R. Thuener	4-3-87
- Chief Engineer, ESC Division	J. Jordan	3 April 87

QA Compliance [illegible] 4/6/87

- PMC Engineering Manager [illegible] 7/24/87

Q.A. REVIEW
ENTRY NO. N/A
INIT. [illegible] DATE 7/27/87

FILE NUMBER ______

4549G

10/86

SECTION 02930

SEEDING

PART 1 - GENERAL

1.1 SCOPE

A. This Specification Section describes the requirements for seeding of areas disturbed by demolition operations.

B. The following areas shall be seeded as specified herein: areas where poles, yard structures, and foundation of any description have been removed, all backfilled areas, and all areas disturbed by demolition operations; except that surfaced areas and solid rock shall not be seeded.

PART 2 - PRODUCTS

2.1 SEED

A. All seed shall comply with the requirements of the Missouri Seed Law. Minimum purity shall be 90 percent. Minimum germination including hard seed shall be 80 percent. Maximum weed seed shall be 1.0 percent.

B. The seed mixture from August 1 through April 15 shall be Annual Rye Grass - 10 lb/acre; Orchard Grass - 2 lb/acre; Lespedeza - 5 lb/acre; and Switch Grass - 3 lb/acre.

C. The seed mixture from April 16 through July 31 shall be Big Blue Stem - 10 lb/acre; Indian Grass - 10 lb/acre; and Little Blue Stem - 10 lb/acre.

2.2 FERTILIZER

Fertilizer shall contain equal percentages of nitrogen, phosphorous, and potash, applied at a rate of 65 pounds of each ingredient per acre.

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Q.A. REVIEW
ENTRY NO. N/A
INIT. [illegible] DATE 11/30/87

2.3 MULCH

Mulch shall be the cereal straw from stalks of oats, rye, wheat, or barley. The straw shall be clean and bright, relatively free of foreign material, and be dry enough to spread properly. If the above straw specifications cannot be met practicably, the foliage of the following plants may, with the Contractor's approval, be substituted: smooth brome, timothy, orchard grass, reed canary grass, red top, millet, blue stem, indian grass, alfalfa, birds-foot trefoil, and vetch. The foliage shall be taken from areas of relatively pure stands of plants of the current season's growth.

PART 3 - EXECUTION

3.1 GENERAL

A. The seedbed shall be prepared and fertilized and shall be in a firm but uncompacted condition with a relatively fine texture at the time of seeding.

B. Seeding shall be done before the proposed seedbed becomes eroded, crusted over, or dried out and shall not be done when the ground is in a frozen condition or covered with snow.

3.2 HYDRAULIC SEEDING AND FERTILIZING

A. In lieu of mechanical application of seed and fertilizer, hydraulic application may be used. On slopes steeper than 2:1, or when seeding is applied to a previously seeded and mulched area, seed and fertilizer may be applied hydraulically in a single operation and incorporation into the soil will not be required. On all other slopes, seed and fertilizer may be applied hydraulically provided the seed and fertilizer are applied separately. The seed and fertilizer shall be incorporated into the soil as specified under mechanical seed application.

B. Seed and fertilizer, separately or in combination, shall be mixed with water and constantly agitated so that a uniform mixture can be applied hydraulically to the specified areas. The ratio of seed and fertilizer to water shall be calculated by determining the number of square feet covered by a given quantity of water. Seed shall not be added to the water more than 4 hours before application.

FILE NUMBER: ______________

3.3 DRY SEEDING

Dry seeding shall be done mechanically with equipment designed for even distribution of dry seed. The equipment may either be hand operated, such as knapsack seeder, or be tractor-drawn, such as seed drill, except that tractor-drawn equipment will not be permitted on a previously seeded and mulched area. Seed scattered on the surface shall be covered with approximately 1/4 inch of soil by raking or other approved methods except that raking will not be required when seeding a previously seeded and mulched area. Seed placed in the soil shall be approximately 1/4 inch below the surface. After completing the seeding operation, the contractor shall firm the area by rolling, if in the judgment of the Contractor the seedbed is either too loose or contains clods which would reduce the germination of the seed. When rolling is required, a lawn-type roller shall be used and care shall be taken to avoid over-compacting the soil.

3.4 MULCHING

Mulch shall be applied after seeding at the rate of 2 tons per acre.

END OF SECTION 02930

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

SPECIAL CONDITIONS

SUBCONTRACT NO. 3589-SC-WP018

ELECTRICAL POWER AND POLE REMOVAL

MK-FERGUSON COMPANY

WELDON SPRING REMEDIAL ACTION PROJECT

ST. CHARLES, MISSOURI

Dated: 07-28-87

3589-SC-WP018

SPECIAL CONDITIONS

MK-FERGUSON CONSTRUCTION SUBCONTRACTS

TABLE OF CONTENTS

TABLE OF COMMENTS

SC-1 WORK TO BE ACCOMPLISHED

The work scope consists of furnishing all labor, supervision, equipment and materials (except as otherwise specified), and performing all work in strict accordance with Federal, State and Local laws, codes and regulations. The work in general consists of:

Removal of all overhead wiring (power, telephone, etc.) from the site yard areas outside of the building. Poles are to be removed, cut and placed with rolled wire in an area designated on site.

The above description of work is for general information only and in no way limits the responsibility of the Subcontractor for constructing the Work in strict accordance with the subcontract drawings and specifications.

SC-2 DEFINITIONS

See GP2 For General Definitions

SC-3 LOCATION

The work to be accomplished is located at the abandoned Uranium Feed Materials Processing Plant at Weldon Spring, Missouri.

SC-4 HOLIDAYS

The following will be observed as holidays by the Contractor:

* Christmas Day
Columbus Day
* New Year's Day
Presidents' Day
Memorial Day
* Independence Day
Labor Day
Thanksgiving Day
Day Following Thanksgiving

* Holidays occurring on Saturday or Sunday will be on Friday or Monday.

Upon written notice from the Subcontractor 5 days in advance, the Contractor will adequately man the job on Contractor holidays not observed by the Subcontractor.

SC-5 SECURITY REQUIREMENTS

A. Access

1. Access to the site is via the main gate on Highway 94 South. The gate is normally open from 7 a.m. to 6 p.m. and the normal work day is from is 8 a.m. to 4:30 p.m., Monday thru Friday.
2. Special controls are established at the Weldon Spring site to govern personnel access. A guard station is located approximately 50 feet inside the main gate.

3. All privately and Subcontractor owned vehicles shall stop at the guard station.

4. The Subcontractor will have a specific identification symbol prominently displayed on each vehicle for entry to the site. A sample of this symbol will be given to MK-F prior to starting work.

5. If no specific identification symbol is displayed on a vehicle, each person shall sign in and out with the guard before entry to the site.

SC-6 TEMPORARY UTILITIES

A. Telephone Service

Telephone service will not be provided by the Contractor. The Subcontractor shall make his own arrangements for any telephone service desired.

B. Electrical Power for Construction

Electrical power for construction will not be provided by the Contractor. The Subcontrac tor shall make his own arrangements for construction power.

C. Toilet and Washroom Facilities

Toilet and washroom facilities shall be provided by the Contractor. Emergency showers are available in Trailer 7 and 8.

D. Temporary Water Facilities

1. Drinking water shall be furnished by the Subcontractor.

2. If authorized by the Contractor, temporary supply lines, standpipes, and connections over and above those facilities presently existing and available shall be furnished and installed by the Subcontractor and shall be removed upon the completion of the need for such temporary facilities.

SC-7 CONSTRUCTION RESTRAINTS

There are no known restraints at this time. The Subcontractor should be aware that more than one subcontractor may be working in the areas identified in the Work Scope. These areas are to be used jointly and the Subcontractor shall be responsible to coordinate his work activities with ongoing activities.

SC-8 TEMPORARY STORAGE OF CONSTRUCTION MATERIAL

The Contractor will provide space for storage of materials and equipment during performance of the Work Scope.

The Subcontractor is responsible for the security of his equipment and material.

SC-9 CLEANUP AND WASTE DISPOSAL

A. Cleanup

The Subcontractor shall maintain a neat and orderly work area. Cleanup of the construction work areas shall be required on a daily basis. Waste and debris shall not be allowed to accumulate in such quantities as to create an unsightly appearance, a safety or fire hazard. All construction areas shall be thoroughly cleaned to the satisfaction of the Contractor prior to final acceptance of the completed project(s).

B. Waste Disposal

The Subcontractor shall provide suitable receptacles and dispose of all waste material such as paper, discarded containers, scrap lumber, scrap metals, etc., by removal from the work area to on-site disposal or storage areas.

SC-10 CONSTRUCTION HEALTH AND SAFETY

A. Contractor Safety Program

1. Subcontractors shall comply with all applicable Local, State, DOE/WSSRAP and Federal Safety Codes, Regulations, Standards and Special Procedures.

   A Subcontractor may submit his own Safety Program to the Contractor for review. The Subcontractor's program must be equal to or more stringent than the WSSRAP Construction Safety and Health Program for acceptance and use. The Subcontractor's Safety and Health Program shall be an integral part of this Subcontract including mandatory implementation and compliance by the Subcontractor.

2. During the Pre-Bid Meeting a copy of the WSSRAP Construction Safety and Health Management Program will be made available for review per request. The successful bidder will be issued a copy with the Notice of Award by the Contractor's Subcontract Administrator. A Table of Contents for the WSSRAP Safety and Health Program is presented on Figure 1.

Figure 1

SAFETY AND HEALTH MANAGEMENT PROGRAM

TABLE OF CONTENTS

B. <u>CONSTRUCTION SAFETY & HEALTH INITIAL INDOCTRINATION & TRAINING</u>

1. All Subcontractor personnel working on the site shall receive the basic Construction Safety and Health Initial Indoctrination and Training from the Construction Safety and Health Manager. The Indoctrination will be oral or written and will take 30 minutes. <u>No Subcontractor personnel will be permitted to work without having received this basic indoctrination.</u>

2. Indoctrination requirements will not apply to routine delivery men who will be escorted while on site by Contractor personnel.

C. <u>Smoking, Drinking, Eating and Chewing Restrictions</u>

No smoking will be permitted in the immediate vicinity or any flammable liquids, gases or highly combustible material, or in any plant area posted as a non-smoking area. No smoking, eating or chewing will be permitted in any controlled area.

SC-11 <u>HEALTH PHYSICS</u>

All work performed under this subcontract shall conform to the Construction Safety & Health Management Program-SEC XIII, SEC XIV, SEC XV.

The Subcontract work area is located within a radiologically controlled area. The Contractor will provide formal radiation training (2 hours in duration) and dosimetry requirements of bioassay and TLD prior to commencement of the work.

A. Work Conditions

1. Some areas beyond the control point have special Health Physics restrictions. These are controlled by ribbons, signs, and tags. Such restrictions shall be observed by the Subcontractor and applicable precautions taken.

2. Radiation exposure on this subcontracting effort will be maintained well within allowable radiation exposures.

3. Personnel protection equipment: The level of protection will generally require coveralls, cotton gloves, and rubber boots. These items will be provided by the Contractor.

4. Personnel Monitoring: All personnel will be monitored for radioactive contamination upon leaving radiologi cally controlled area. Personnel will be instructed in self-monitoring procedures if necessary.

5. Vehicles Monitoring: All vehicles, tools, & equipment, used inside a controlled area will be monitored for radioactive contamination by ES&H personnel before leaving the area.

6. ES&H Monitoring: The ES&H personnel will provide radiological surveillance over work activities and advise the Subcontractor on matters concerning radiation safety.

B. Warning Signals: In emergency cases, the Subcontractor may depend on direct verbal information from the Contractor's personnel for warning signals. The Subcontractor's foreman and employees shall take action as directed. The Subcontractor's representative shall obtain the name, position, and agency of the messenger providing such direction.

C. Disposition of Contaminated Equipment, Tools and Material:

1. The Subcontractor shall use his own equipment in performing the required work under this Subcontract. All tools, vehicles, equipment and material will be inspected for radioactive contamination by Contractor personnel prior to removal from the construction area. Site experience has shown that no decontamination problems have occurred.

2. Should the Subcontractor's tools, material, or equipment become

contaminated, they will have to be decontaminated before removal from the area. If decontamination becomes necessary, the Contractor will provide instructions for decontamination which may consist of steam cleaning, dry brushing, or washing with appropriate liquids. Decontamination required beyond these described will be handled under Article 59, "CHANGES" of the General provisions.

3. If decontamination proves impracticable or impossible, the tools, material, or equipment in question will be retained and an equitable adjustment of the value of the equipment for same will be negotiated with the Subcontractor provided that:

   a. There is no fault or negligence of the Subcontractor contributing to the contamination;

   b. The Subcontractor has followed all the specific instructions of the authorized HP personnel who have surveillance over the worker;

   c. Item or equipment confiscated from the Subcontractor is documented by a Confiscation Notice furnished to the Subcontract Administrator by the Contractor and signed by HP personnel and the Operations Manager or his designee.

   d. The Subcontractor allows reasonable time (a maximum of five (5) working days, excluding weekends and holidays) in which to attempt decontamination of the item(s) in question.

4. If reimbursement is required for tools, material or equipment, the following compensation will be made:

   a. Tools valued less than $300.00: 95% of replacement cost.

b. Tools/equipment $300.00 and up: If less than one (1) year old or at top of depreciation schedule, at 75% of replacement cost; if at bottom of or off the depreciation schedule, at 50% of replacement cost.

SC-12 TEMPORARY HEAT AND COLD WEATHER ENCLOSURES

A. Temporary heating if needed shall be conducted in strict accordance with the applicable section of the Construction Safety and Health Management Program. The Subcontractor shall provide all temporary heat and/or heating equipment required for his use. The Subcontractor shall provide a watchman to check the heater when they are in operation and construction crews are not working at the job site. The use of open-type or oilpot salamanders, and gasoline-fueled heaters is prohibited. All products of combustion-type heaters shall be directly vented to the exterior of the structure and/or temporary enclosure.

SC-13 PARKING FACILITIES

A. Construction personnel shall park their vehicles in the designated parking area.

SC-14 EATING FACILITIES

A. No lunch room or cafeteria facilities are available.

SC-15 DAILY REPORT

A. The subcontractor shall submit a daily report to the Operations Department stating the following information:

1. Work Accomplished
2. Manpower
3. Equipment
4. Problems or delays

SC-16 <u>INSURANCE</u> (Reference GP-33)

A. Subcontractor shall procure and maintain, during the period that this order remains in force, insurance coverages and limits of not less than those set forth in this agreement. Subcontractor will require all insurance companies issuing policies of insurance for Subcontractor, to certify to the Contractor in writing prior to commencement of any work, that such policies have been issued and are currently in effect.

Subcontractor agrees to waive any subrogation rights against Contractor.

Policies issued for Subcontractor shall be endorsed to include the following for the benefit of the Contractor.

* A 30 day advance written notice in the event of cancellation, non-renewal or material change of any policy.

* Contractor named as Additional Insured, as interests appear (Coverage B below).

* Subcontractor's insurance is primary and any insurance maintained by Contractor is excess and non-contributory.

* Cross liability or severability of interest clause (liability policies only).

INSURANCE COVERAGES

Type of Coverage: A

Worker's Compensation and, where an exposure exists Federal Employees Liability Act, U.S. Longshoremen & Harbor Workers', Jones Act and Employer's Liability.

Policy Limits:

State and Federal Acts - Statutory
Employer's Liability - $1,000,000

Type of Coverage: B

Comprehensive General Liability including coverages for Independent Contractors, Products and Completed Operations (extending for at least 24 months after completion of operations) Blanket or Broad Form Contractual, Personal Injury Liability, Broad Form Property Damage, and where an exposure exists and explosion, collapse and underground (XCU) hazard exclusions deleted.

Policy Limits:

$1,000,000 each occurrence Bodily Injury.

$500,000 each occurrence Property Damage: or $1,000,000 Combined Single Limit.

Type of Coverage: C

Comprehensive Automobile Liability including coverage for owned, non-owned and hired vehicles.

Policy Limits:

$500,000 each person/$1,000,000 each occurrence.

Bodily Injury/$500,000 each occurrence Property Damage: Or $1,000,000 Combined Single Limit.

B. In the event any work to be performed under this subcontract is sublet, the Subcontractor will require the same insurance coverage and limits from its lower tier Subcontractors or suppliers and will require said lower tier Subcontractors or suppliers to certify insurance coverage to the Contractor prior to the commencement of any sale or work.

C. If Subcontractor shall fail to certify required insurance coverage to the Contractor as set forth above, before commencing work hereunder the Contractor may, at its option, place insurance of the character, nature and limits described above to cover the operations of the Subcontractor, paying the premiums for same and charging same to the Subcontractor.

D. The Contractor, by requiring the foregoing minimum insurance coverages, will not be deemed to limit any of the other obligations or liabilities of the Subcontractor, deductibles if any, will be solely for the account of the Subcontractor.

E. Should Contractor require additional insurance subsequent to the acceptance of this subcontract by Subcontractor, the net cost thereof shall be an addition to the Subcontract price. Such request must be made in writing to Subcontractor.

F. Notwithstanding any trade practice or custom, neither the Subcontractor nor any lower tier subcontractor or supplier shall be entitled to the benefit of any insurance Contractor or its Customer have in effect of which either might have obtained.

SC-17 QUALITY ASSURANCE

All work performed under this Subcontract shall conform to the requirements of the Contractor's Quality Assurance Program Plan. The Subcontractors work will be subject to inspection and Quality Assurance audits by the Contractor. A copy of the Quality Assurance Program Plan is available upon request from the contractor's office at the Weldon Spring Site.

SC-18 RESERVED

SC-19 SUPERINTENDENCE BY SUBCONTRACTOR

A. SEE GP-46 For General Requirements

B. In accordance with Article GP-46, a full-time working supervisor shall be required.

SC-20 DISPOSITION OF REMOVED EQUIPMENT, MATERIAL, AND SCRAP METAL

All material or equipment removed from any existing system (plant site or quarry), or structure, shall be transported to a storage location as specified by the Construction Engineer, and turned over to MK-F for disposition for the Government.

All potentially reusable material or equipment shall be properly identified, tagged, and checked for contamination before transporting to a storage location identified by the Construction Engineer.

SC-21 SCHEDULE/SCHEDULE OF VALUES

A. SEE GC-6 For General Requirements

B. In General, schedule items should be limited to approximately two (2) weeks duration and limited to approximately ten (10%) percent of the total project value.

SC-22 DISPOSITION OF EXCAVATED SOIL

A. Excess Soil

Soil removed during excavation that is needed for backfill shall be stacked in such a manner as to allow the Contractor and others free and clear access (including road access) to all existing buildings and other operating facilities. In those cases where the stacking of soil near the excavation would restrict vehicle traffic or prohibit access to the buildings and operating facilities, or create congestion of the work area, the Subcontractor shall temporarily stockpile the soil in an area identified by the Construction Engineer away from the excavation until backfill operations are designated. All excess soil removed from excavations (soil displaced in excess of that needed for backfill) shall be disposed of as directed by the Construction Engineer. All soil to be removed to the disposal site shall be free of non-soil materials such as concrete, wood, asphalt, metal, plastic, etc.

B. Radioactively Contaminated Soil

Radioactively contaminated soil will be encountered during excavations required for this Subcontract. Disposal of said soil shall be at the direction of the Construction Engineer.

SC-23 TRAINING AND INDUSTRIAL HYGIENE

A. Training Requirements

1. All personnel who will work in access controlled areas of this site must have undergone a health and safety training program in accordance with 29 CFR 1910.120. This training shall include appropriate respiratory protection training. The training shall be provided by the Subcontractor for its own personnel. Supervisory personnel shall receive additional training in health and safety in accordance with the same regulation.

2. Documentation of completion of this training must be provided to the PMC prior to or upon the arrival of each employee at the site. This documentation must consist of, at a minimum, the dates of training, a description of the contents of the course, a copy of a letter or certificate signed by the person conducting the training course and any additional supporting information which the PMC may deem necessary. Personnel will not be allowed to enter the site until this documentation is received.

3. The Subcontractor shall provide training which addresses the major hazards at the WSS. The Health and Safety Guidebook to the Weldon Spring Site included with this request for proposal presents further details on the known hazards at this site and their locations.

4. Once at the site, personnel shall be briefed by the PMC on the known hazards at this site. This briefing will require approximately four hours per employee during an initial orientation to the site. Locations of WSS hazards will be discussed during this orientation.

B. Medical Surveillance

1. All personnel who work in access controlled areas of the site must be participants in a medical surveillance program. This program must be designed, at a minimum, to detect the effects of exposure to the major hazards listed above.

2. Documentation of the fitness of each employee to work and, where applicable, to wear a respirator at a hazardous waste site or near the major hazards listed above must be received by the PMC upon or prior to the arrival of the employee at the site.

C. Work Conditions

1. The work area in which this contract is to be performed is known to be contaminated with the following materials:

   Asbestos
   Uranium
   Chlorodiphenyls (PCBs)
   Nitroaromatics (TNT, 2,6-DNT, etc.)
   Mercury

   The Subcontractor is responsible for providing adequate equipment and procedures for controlling exposure of its personnel to these materials and for controlling the spread of these materials from its work area to other areas of the site.

2. Known contaminated areas and health hazards are posted by the PMC. Subcontractor personnel shall obey posted warnings.

3. Any health hazard(s) created by the Subcontractor shall be posted by the Subcontractor. The PMC shall be notified immediately of all such hazards.

4. Personal protection or engineering control equipment appropriate to the potential hazards to which personnel performing the work under this subcontract shall be provided by the Subcontractor.

5. Heat stress has been noted at this site due to the warm, humid climate, the personal protective equipment requirements and the prohibition on eating and drinking in certain areas of the site. The Subcontractor is responsible for providing a heat stress management program to its personnel.

6. Biological hazards in the form of poison ivy, snakes, ticks, mosquitoes, and high airborne mold concentrations have been noted at this site.

EE DRAWING NO. 5121E - CP - 525
OR GENERAL NOTES, REFERENCE
RAWINGS AND LEGEND.

100 0 100 200
SCALE FEET

MKE DOCUMENT NO. 5121 - C : DW - D - 01 - 0115 - 02

DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

CHEMICAL PLANT
CONSTRUCTION DRAWINGS
PLAN
CTRICAL LINES AND POLE REMOVAL
NORTH (SHEET 1 OF 2)

IEF ENG./QA MGR. DATE	PMC ENG'G MGR. DATE	DOE PROJ. ENG. DATE
G. Smith P.D. Conston 3/13/87	4/15/87	

N ENGINEERS, INC.

CA 94105

PROJECT NO.
DE-AC05-86OR21548

DRAWING NO.
5121E-CP-524-02

REV.
2

DOCUMENT NUMBER:

CP - ELECTRICAL LINES & POLE REMOVAL

MAIN ELECTRICAL LINE FEEDER NUMBER

100 0 100 200

SCALE FEET

MKF DOCUMENT NO. 5121 - C : DW - D - 01 - 0116 - 01

S. DEPARTMENT OF ENERGY

OAK RIDGE, TENNESSEE

CHEMICAL PLANT

CONSTRUCTION DRAWINGS

PLAN

LECTRICAL LINES AND POLE REMOVAL

SOUTH (SHEET 2 OF 2)

CHIEF ENG/QA MGR DATE	PMC ENG'G MGR DATE	DOE PROJ ENG DATE
D. Coraton 3/13/87		

ENGINEERS, INC.

PROJECT NO.	
DE--AC05--86OR21548	
DRAWING NO.	REV
5121E-CP-525-02	2

ELECTRICAL LINES & POLE REMOVAL

IRA-600-604

cc: D. R. Lewis
R. A. Nelson
A. J. Stewart

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

3589-87-I-EPA-010

M-K FERGUSON CO.
RECEIVED
NOV 06 1987
WSSRAP CONTRACT 3589

NOV 5 1987

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Electric Power and Pole Removal,
- Overhead Piping/Asbestos Removal,
- Cleanup of Vicinity Property No. 7 on the Army Reserve Area, and
- Disposal of Containerized Chemicals.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

MA-01-02

DOCUMENT NUMBER: I-600-604-1.01

001812

11-6-87

We will provide any comments on these within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay
Regional Administrator

cc: Dr. Fred Brunner, MDNR

bc: Robert Morby
Dan Shiel
Rowena Michaels
Ron Ritter

4/11

NOV 10 1987

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of October 8, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: D. Bedan, MDNR
E. Brown, FLW
w/enclosure

DOCUMENT NUMBER: I-600-604-1.02

CONCURRENCES
RTG SYMBOL PEER
INITIALS/SIG. J. Coyn
DATE 11/9/8
RTG SYMBOL CE-541
INITIALS/SIG. R. Nels
DATE 11/9/8
RTG SYMBOL
INITIALS/SIG.
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DOE F 1325.10 (7-73)

PEER:JCoyne:x41:mw:11/8/87 (IRACom.Ltr.)

OFFICIAL FILE COPY

RESPONSES TO USEPA REVIEW COMMENTS
ON IRA PACKAGES

Cleanup of Vicinity Property No. 7, Army Reserve Area

Comment: The proposal to cleanup this vicinity property calls for excavating the contaminated area to a depth of six (6) inches or where the radium concentration is below 15 pCi/g and then backfilling with clean material. The EPA suggests that while its criteria for residual radium in soil is satisfied by this approach, that we consider removing additional soil to reduce the concentration to below 5 pCi/g. As the area is small, little additional excavation would be required.

Response: Subsequent to the preparation of the IRA package for Army Reserve Vicinity Property #7, the Deparment of Army requested that the area not be backfilled upon completion of the cleanup as proposed by the DOE. The DOE will leave the excavation area open and apply the suface criteria of 5 pCi/g to this particular vicinity property.

Disposal of Containerized Chemicals

Comment: It is suggested that the specifications for this work might be strengthened by adding waste characterization procedures into Section 2.0 (Scope) of the document. The procedures are those which may be required under 40 CFR 260-268, or others required by the permit held by the Treatment, Storage and/or Disposal Facility.

Response: Procedures required in 40 CFR 260-268 will be referenced in Section 2.0 of the Request for Proposal. In addition, it will be emphasized that all waste characterization procedures which are required by the successful bidder's treatment, storage and/or disposal facilities permit must be satisfied. It will be required that these procedures (if applicable) be presented in the subcontractor's work plan.

Comment: EPA recommends that the specific subcontractor qualifications and experience in handling known and unknown potentially hazardous wastes be defined in the document.

DOCUMENT NUMBER: I-600-604-1.02

Response: We are in agreement with the EPA that the Request for Proposal should contain subcontractor qualifications and experience clauses. The appropriate clauses will be added to the document.

Comment: The EPA recommends that the specification require the successful bidder to identify the specific waste disposal facilities which will accept the containerized chemical waste, in the work plan phase.

Response: The specification will be modified to include provision for certification by the subcontractor that the waste disposal facilities meet the requirements when hazardous wastes are involved. The land disposal ban provision of RCRA will also be addressed as part of the subcontractor's work plan.

<u>General</u>

Comment: The EPA review states that there is one(1) deficiency common to the four proposals and that is that plans for onsite handling and storage of radioactive contaminated materials should be developed.

Response: Plans for onsite handling and storage of radioactive contaminated materials are currently being finalized and will be provided under separate cover.

4711

NOV 10 1987

Mr. David E. Bedan
Missouri Department of
Natural Resources
Post Office Box 176
Jefferson City, Missouri 65102

Dear Mr. Bedan:

MISSOURI DNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in Dr. Frederick A. Brunner's letter of October 26, 1987, regarding the following interim response actions:

1. Electric Power Line and Pole Removal
2. Overhead Piping/Asbestos Removal
3. Army Reserve Area Vicinity Property No. 7
4. Disposal of Containerized Chemicals

We anticipate that this will adequately resolve the issues raised and we intend to proceed with these actions in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: B. K. Biggs, USEPA
E. Brown, FLW
w/enclosure

DOCUMENT NUMBER: ______

CONCURRENCES
RTG SYMBOL PEER
INITIALS/SIG. J. Coyne
DATE 11/9/87
RTG SYMBOL CE-541
INITIALS/SIG. R. Nelson
DATE 11/9/87
RTG SYMBOL
INITIALS/SIG.
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INITIALS/SIG.
DATE

PEER:JCoyne:x41:mw:11/9/87: (c:DNRCom.Ltr.)

RESPONSES TO MDNR COMMENTS
ON INITIAL FOUR (4) IRA PROPOSAL PACKAGES

I. Removal of Overhead Piping and Asbestos Removal

Comment: The DNR states that Missouri has adopted the Federal Clean Air Act standards for asbestos handling and has been delegated responsibility for implementing these standards and that asbestos and piping removal activities are subject to both the Missouri Air Conservation Law and the Missouri Solid Waste Management Law. DNR recommends that we maintain close contact with the Air Pollution Control Program to insure compliance with these standards.

Response: DNR Air Pollution Control Program office will be kept apprised of plans for asbestos removal work at the Weldon Spring Site. The WSSRAP will comply with requirements for disposal of asbestos and other demolition wastes in accordance with the Missouri Solid Waste Management Act.

Comment: The DNR has determined that the overhead piping and asbestos should be handled as a "special waste".

Response: We are proceeding to include the Special Waste Disposal Request form in the Request for Proposal for this work.

Comment: The DNR states that onsite handling of asbestos and other demolition waste may also be subject to Missouri Solid Waste Management Law requirements and requests that we furnish information on the size, design, location of the staging area and the amounts and methods of handling for the materials to be handled in the materials staging area.

Response: Information on handling and staging of the materials will be furnished to the DNR prior to issuing requests for proposals for this work.

modnrrsp,txtsheil

DOCUMENT NUMBER: ______________

II. Disposal of Containerized Chemicals

Comment: Define specific levels at which the containerized wastes are considered radioactive.

Response: WSSRAP is developing concentration levels for wastes containing natural uranium for review and acceptance by concerned federal agencies. We will advise the DNR of this determination as it comes available. Until this determination is made we will retain on site containerized chemical materials which contain detectable levels of radioactive materials as determined by our onsite instruments.

Comment: What are removal plans for underground storage tanks on site?

Response: The underground tanks at the WSS have been sampled and found to contain only rainwater with trace amounts of motor fuel. The drainage and removal of the underground tanks is not part of the containerized chemical inventory and removal IRA Scope of Work. They may be removed as part of a subsequent IRA.

Comment: The document appears to be a generic outline for removal of waste. Items such as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. are not detailed.

Response: The IRA documentation represents a request for proposal to be sent to potential removal subcontractors. The responsibility for developing a detailed work plan addressing such items as disposal facilities, transporters, waste characterization procedures, waste treatment procedures, etc. rests with the successful bidder. A requirement of the subcontract specification is the development of the subcontractor's work plan which must be approved by the WSSRAP before the work may begin. The DNR will be provided a copy of the subcontractor work plan when it becomes available for review. The WSSRAP office requests that the State provide a timely review (14 calendar days) to avoid delaying the subcontractor's

efforts. The State will be given 2-weeks notice of the interval at which time the work plan will be available for review.

III. Remedial Action on Army Vicinity Property

Comment: DNR states that the interim measure suggested is lacking in detail and should contain information on:

- How the removal is to be conducted?
- How and where excavated material will be contained?
- Health and safety plans for the work.
- Why is DOE recommending only remedial action for this vicinity property?
- When does DOE plan to remove the additional contamination in the other six locations?

Response: The technical requirements, i.e. specifications, drawings, special conditions, etc., did not accompany this IRA package for review as they were incomplete at the time of package submittal. Requirements for removal, containment and storage, and health and safety plans will be included in the Request for Proposal for this work.

The very small quantity (less than two cubic yards) of contaminated material can be removed manually and will not require any significant mechanical equipment. The technical specification developed for this work will provide required direction to the subcontractor.

We plan to excavate and place the contaminated soil in 55 gallon drums. The drums will be sealed, placed and stored in a dry, concrete floored building at the Weldon Spring Site awaiting final disposition. Total volume is anticipated to be less than 5 drums.

No unusual hazards are anticipated for this activity. The contract will require workers to abide by the WSSRAP Environmental, Safety and Health Plan.

IRA-600-605

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE ARFS FILE # IR-0700

TABLE OF CONTENTS

The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-700-701

IRA-700-702

IRA-700-703

3589-87-I-DOE-177

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

October 16, 1987

M-K FERGUSON CO.
RECEIVED
OCT 20 1987
WSSRAP CONTRACT 3589

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed are six (6) copies of the documentation for the following four (4) Interim Response Actions:

1. Dismantling of Building 401
2. Dismantling of Building 409
3. Removal of PCB Transformers
4. Debris Consolidation

In addition, we are sending under separate cover, six (6) copies of the technical specifications and drawings from each of the four (4) proposed bid packages.

It is our intention to have copies of these documents in place in the repositories for public inspection, and to provide public notice of their availability on October 19, 1987. This will initiate the twenty one (21) day comment period.

If you have any questions, please give me a call.

Sincerely,

J H McCracken
for
Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosures:
As stated

cc w/enclosures:
D. Bedan, MDNR

DOCUMENT NUMBER: ____________

The public comment period on this interim remedial action ends on November 9, 1987. Comments may be sent to any of the following:

1. Ms. Katherine Biggs
   U. S. Environmental Protection Agency
   Region VII
   726 Minnesota Avenue
   Kansas City, Kansas 66101

2. Mr. David Bedan
   Missouri Department of Natural Resources
   Post Office Box 176
   Jefferson City, Missouri 65102

3. Mr. Rodney R. Nelson
   Weldon Spring Site Remedial Action Project
   Route 2, Highway 94 South
   St. Charles, Missouri 63303

DOE PLAN FOR

DEBRIS CONSOLIDATION

Site Background

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metal were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. The buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the Ordnance Works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE.

Miscellaneous debris is randomly scattered throughout the 88-ha (220-acre) Weldon Spring site. If consolidated, the debris would cover an area of about 0.4 ha (1 acre). This debris consists of numerous articles ranging from small pieces of trash to abandoned vehicles.

Site Characterization

Site debris consists primarily of wooden and metal materials and includes such items as wooden pallets, railroad ties and hardware, assorted steel piping, lockers, tables, empty metal containers and cabinets, wheelbarrows, drinking fountains, water pumps, forklifts, and assorted trucks and trailers. Much of this material may be radioactively contaminated because a considerable amount of the debris was formerly associated with processing operations at the chemical plant.

Threat to Public Health and the Environment

A detailed characterization of site debris has not yet been performed. It is likely that the debris poses a potential radiological health threat, and uncontrolled releases of potentially hazardous materials from the debris could be occurring. In addition, these materials represent a potential safety hazard to workers on the site.

Response Objectives

The objectives of this response action are as follows:

1. Perform a detailed chemical and radiological characterization of the debris to determine appropriate handling and storage procedures in order to minimize exposure hazards and the likelihood of contaminant releases to the environment;

2. Isolate the debris from the work environment to ensure the safety of on-site personnel; and

3. Store the debris in a manner that minimizes the potential for exposure threats and the release of contaminants to the environment.

Proposed Response Action Alternatives

Interim response actions are designed to ensure the health and safety of on-site personnel and to minimize or preclude off-site releases of contaminants. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., actions will be limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

The management of scattered debris at the Weldon Spring site is a two-phased process. The first phase consists of debris characterization and consolidation. The second phase consists of off-site transport to a licensed disposal facility of all material not exceeding chemical and radiological limits for unrestricted release. This proposed interim response action addresses the initial phase of the debris management process.

Alternative response actions identified for debris consolidation are:

1. No action;

2. Consolidation and storage of the debris at several locations throughout the site; and

3. Consolidation and storage of the debris at a single site location.

Analysis of Alternatives

Alternative 1 affords no reduction in the potential safety threat posed by the debris scattered throughout the site. There would be no improvement in environmental conditions at the site if no action were taken. This alternative presents no technical barriers and costs nothing in the short term. However, the debris is scheduled for eventual disposal and its random placement negatively affects groundskeeping and other ongoing activities, as well as associated costs.

Alternatives 2 and 3 are technically feasible, and both will reduce the potential hazards associated with the debris. However, due to the multiple storage locations, Alternative 2 is less desirable based on both environmental and cost considerations. Alternative 3 is more consistent with DOE's intention to facilitate cleanup of the site. Therefore, following the screening and analysis process for interim response action alternatives, Alternative 3 has been identified as the preferred alternative.

Description of Proposed Action

The proposed interim response action involves the following operations.

1. Detailed chemical and radiological characterization of all debris;

2. Separation of radioactive debris from nonradioactive debris, with subsequent transport of the radioactive debris to a designated material staging area located at the Weldon Spring site, pending a decision on final disposal; and

3. Transport of nonradioactive debris to the designated on-site staging area for interim storage and scrap recovery prior to off-site disposal.

Debris consolidation will be performed in compliance with all applicable regulations and procedures. All debris will be radiologically surveyed. Any material exhibiting surface contamination levels in excess of 1,000 disintegrations per minute (dpm)/100 cm^2 removable or 5,000 dpm/100 cm^2 total (fixed plus removable) alpha contamination (U.S. Department of Energy 1987) will be segregated and stored at the designated consolidation area.

Characterization and consolidation of this material would reduce maintenance costs and exposure hazards, as well as the potential for releases of contaminants to the environment, thereby improving environmental conditions at the site.

The total volume of debris scattered throughout the site is estimated to be 9,000 m^3 (12,000 yd^3). Some of this material may be radioactively contaminated in excess of the above criteria or chemically contaminated in excess of applicable levels for disposal in a sanitary landfill. The radiological and chemical characterization of site debris is part of the proposed action. Therefore, volumes of radioactive and hazardous waste cannot be estimated until this work is completed.

References

U.S. Department of Energy, 1987, *U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites* (Revision 2, March).

100 0 100 200

SCALE FEET

MKE DOCUMENT NO. 5121-C : DW - D - 01 - 0110 - 01

U. S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

GNED / DRAWN AMC	CHEMICAL PLANT CONSTRUCTION DRAWINGS
KED	PLAN
ECTED	DEBRIS REMOVAL
MMENDED	

OVED / DATE	CHIEF ENG /QA MGR / DATE	PMC ENG'G MGR / DATE	DOE PROJ ENG / DATE

MORRISON-KNUDSEN ENGINEERS, INC. A MORRISON KNUDSEN COMPANY WSSRA PROJECT 180 HOWARD ST SAN FRANCISCO CA 94105	PROJECT NO DE-AC05-86OR21548	
	DRAWING NO 5121E-CP-513	REV. 1

CP - DEBRIS REMOVAL

DOCUMENT NUMBER: I-700-701-1.03

DOE/OR/21548-159

Engineering Evaluation/Cost Analysis for the Proposed Management of Contaminated Structures at the Weldon Spring Chemical Plant

May 1991

See Document in IRA 18

DOCUMENT NUMBER: I-700-703-1.01(R)

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

IRA-700-704

4/240.2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

NOV 18 1987

OFFICE OF
THE REGIONAL ADMINISTRATOR

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the interim response action for construction of the Ash Pond Dike. We will provide any comments on this proposed action within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay

Morris Kay
Regional Administrator

DOCUMENT NUMBER: I-700-704-1.01

cc: Dr. Fred Brunner, MDNR

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11-23-87

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DEC 09 1987

CONCURRENCES
RTG SYMBOL PEER
INITIALS/SIG. J. Coyne
DATE 12/7/87
RTG SYMBOL CE-541
INITIALS/SIG. RRN R. Nelson
DATE 12/9/87
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Ms. B. Katherine Biggs
United States Environmental
  Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of November 9, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR

DOCUMENT NUMBER: I-700-704-1.02

PEER:JCoyne:x41:mw:12/04/87: (c:EPA-IRA'.Ltr.)

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated November 9, 1987 re:

Interim Response Actions

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

General

Comment: Generally, a more thorough analysis and screening of response alternatives would be appropriate.

Response: This comment was reviewed with the EPA (telecon from Rod Nelson to Dan Wall dated 11-17-87). The EPA agreed that while additional analysis and screening is not required for the four (4) IRA proposals addressed herein, future proposals such as the Ash Pond Isolation Dike will present a more thorough analysis of response alternatives.

Comment: The documents do not contain sufficient detail of the work to be done to stand alone without the support of the technical specifications and drawings.

Response: Technical specifications and drawings will continue to accompany the IRA proposal packages submitted for review.

Building Demolition

Comment: Specifics of handling, storage, and ultimate disposal of radioactively contaminated waste should be presented.

Response: Radioactively contaminated waste from demolition of Buildings #401 and #409 will be segregated and stored on-site in a dry, concrete floored building, Building #434 and/or Building #406. Ultimate disposal will be in accordance with the RI Plan/EIS. Specifics of handling this waste will be covered in the Contractor's operational work plan which will integrate the specification and drawings, the WSSRAP Construction Safety and Health Management Program, applicable WSSRAP Standard Operating Procedures and Plans along with the subcontractor dismantling plan. This work plan will be finalized prior to the Subcontractor(s) starting demolition work.

response,txtsheil

DOCUMENT NUMBER: I-700-704-1.02

Comment: What guidelines will be used by the demolition subcontractor to determine the hazard potential of unknown materials encountered in the work?

Response: Subcontractor personnel who will work on the site will be required to undergo a minimum of 40 hours of initial instruction in hazardous waste operations prior to starting work on site in accordance with 29CFR1910.120. In addition Subcontractor personnel will receive indoctrination training in the known hazards in the work area prior to start of work in accordance with the WSSRAP Construction Safety and Health Management Program and Special Conditions requirement of the subcontract. Unknown (unidentified or unmarked) chemical substances encountered in the work shall be considered potential hazards and shall be reported to the Contractor in accordance with the requirements of the specifications.

The Contractor will also provide health physics, construction safety and industrial hygiene surveillance on a routine basis during all stages of the work. This will include inspections of all work areas to identify potential hazards. Where required, the Contractor will collect bulk samples to identify any unknown or suspected substances. The Contractor will also perform air monitoring, as necessary and prudent, to assess exposure levels of hazardous substances in the workplace.

Comment: The responsibility for determining whether a pollution condition has or will be created should be clearly specified.

Response: The WSSRAP Construction Safety and Health Management Program which is an integral part of site subcontracts assigns responsibility for the identification of potential pollution (environmental) conditions to the Project Management Contractor. The Subcontractor is contractually required to comply with the requirements of the Clean Air Act and the Clean Water Act.

Comment: The specification does not state the health and safety requirements for the subcontractor.

Response: Subcontractor health and safety requirements are defined in the Special Conditions to the subcontract. The Special Conditions bind the Subcontractor to compliance with the WSSRAP Construction Safety and Health Management Program and all applicable Federal, State, and local health and safety regulations and standards listed therein. The Special Conditions are a supplement to the General Conditions and General Provisions which also contain basic health and safety requirements.

PCB Transformer Removal

Comment: In this case, more detail in the site characterization section of the text would be appropriate. For instance, the PCB transformers are categorized as those containing PCBs at concentrations greater than 500 ppm. It may be somewhat misleading not to indicate in the text that the concentrations in these transformers are in excess of 350,000 ppm.

Response: The final subcontract work package includes a table on the subcontract drawings listing each electrical component in the scope of work. This table includes the PCB concentration and volume capacity, in gallons, of each electrical component.

Comment: Disposal facilities under consideration for receipt of these wastes must provide certification that they meet the Superfund offsite policy.

Response: The Work Plan specified in Section 1.2A of Specification Section 02090 includes provision for meeting all requirements of 40CFR761. The Subcontractor's Work Plan in section 1.4A will be required to contain certification that the facilities selected for disposal of the waste material (1) have received written approval from the U. S. Environmental Protection Agency as required under 40CFR Part 761.70 or 761.75, as applicable, and (2) are not under a state or federal compliance order under CERCLA or RCRA.

Debris Consolidation

Comment: It is stated in the description of the response action that one of the response objectives is to "Perform a detailed chemical and radiological characterization of the debris...". The description of the response action and specifications document contain no guidelines, references or information which would allow the Subcontractor to complete this objective.

Response: This objective is to be completed by the Contractor and does not require any special activity by the Subcontractor. Radiological guidelines to be used by the Contractor in performing this characterization are as defined in Draft DOE Order 5480.11 and applicable WSS operating procedures. All debris will be visually inspected for potential chemical contamination. Where chemical contamination is observed or suspected, sampling and analyses will be performed to identify the characteristics of the chemical.

Comment: More specifics regarding the handling, storage and ultimate disposal of radioactive contaminated wastes are needed.

Response: Specifics of handling the radiologically contaminated debris will be finalized upon submittal of the Subcontractor's work plan. That plan will be integrated with applicable WSSRAP Standard Operating Procedures and Plans, the WSSRAP Construction Safety and Health Management Program, and the specifications and drawings. The debris will be consolidated for temporary storage in a materials staging area. Details of the materials staging area will be presented in a separate IRA under preparation. Ultimate disposal of radioactive contaminated debris waste will be in accordance with the RI Plan/EIS.

3589-87-I-DOE-241

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

December 21, 1987

M-K FERGUSON CO.
RECEIVED
DEC 29 1987
WSSRAP CONTRACT 3589

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

MDNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our responsiveness summary for the comments contained in Dave Bedan's letter of November 12, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

J H McCracken

for Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR, w/enclosure
Jack Hammond, MK-F, w/o enclosure

DOCUMENT NUMBER: I-700-704-1.03

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated 11-13-87 re: MoDNR comments on:

Interim Response Actions

1. Dismantling and Disposal of Building #401
2. Dismantling and Disposal of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

1. <u>Dismantling and Disposal of Buildings #401 and #409</u>

Comment: The DOE and its Contractors should develop and maintain close contact with the Missouri Air Pollution Control Program to assure compliance with Missouri Air Conservation Law and Missouri Solid Waste Management Law in carrying out these activities.

Response: The DOE and its subcontractor(s) will continue to keep the DNR Air Pollution Control Program office apprised of plans for work at the site involving removal, handling, storage, and/or disposal of asbestos materials.

Comment: Missouri Solid Waste Management Law requires demolition waste to be disposed of in a permitted sanitary or demolition landfill. Asbestos waste must be disposed of in a permitted sanitary landfill.

Response: The Specifications for this work will require that asbestos and other demolition debris be disposed of in accordance with the requirements of the Missouri Solid Waste Management Law.

Comment: DNR maintains that because of the special concerns relating to the volume of waste and to the possible contamination of the asbestos and the other demolition material with hazardous wastes or radioactive wastes, these materials should be handled as "special wastes".

Response: The DOE concurs that there are special circumstances that require handling of asbestos as "special waste". Specifications for the asbestos subcontracts contain this provision.

The pending subcontracts contain the "special waste" forms which will be included in the

DOCUMENT NUMBER: I-700-704-1.03

subcontract work packages as matter of comity. Should subcontract efforts, cost or progress on these IRA's be impacted by this provision, the DOE will revisit this issue with the MDNR.

Comment: The DNR cannot approve the disposal of the asbestos and other demolition wastes until a procedure is in place to assure us that no radioactive or hazardous materials are being disposed of in Missouri solid waste landfills.

Response: Release standards are in place for controlling release of the rubble off site. Radiological survey and release plans will be developed for each work package involving removal and off-site disposal of materials to insure compliance with the standards.

Comment: DOE should provide justification for its policy to dispose of all non-radioactive building waste off site.

Response: The DOE policy is based on volume reduction and cost effectiveness. By disposal of nonradiological material in a sanitary or demolition landfill, there is a reduction in the amount of material (Volume Reduction) that will be encapsulated in any disposal cell. Secondly, costs for on-site disposal cells are high in comparison to disposal in sanitary or demolition landfills. Also, as an aside to the technical and cost effectiveness issues, the DOE currently has funding available. The site is still to be fully characterized and to delay demolition and disposal of clean materials would not allow these funds to be utilized and also would lead to overall slipping of the schedule.

2. Removal of PCB Transformers

Comment: MDNR recommends that if Alternative #5 is used, during the "flushing" process care should be taken to contain any spilled material. Also, "flushing" should be continued until PCB levels are less than 2 ppm, if transformer and switch carcasses are going to be disposed into a permitted sanitary landfill.

Response: The subcontract specifications for this interim response action include spill control provisions for draining and flushing operations. Spill control pans are specified to collect any spilled liquids. PCB transformers and other electrical

equipment which have been drained and flushed, as stated in the specifications, will be disposed of at an EPA approved PCB disposal facility, not a sanitary landfill.

Comment: If the PCB liquids are being transported to a disposal facility within Missouri, a licensed hazardous waste transporter must be used. If the PCBs are being transported to an out-of-state facility MDNR recommends that a licensed transporter be used although it is not a requirement.

Response: The specifications state that the transporter of the PCB liquids and drained electrical equipment shall be licensed.

Comment: In the preamble to 40 CFR 761, unless otherwise tested, all dielectric transformers are assumed to contain 50-500 ppm PCB, therefore untested transformers (22, 32, and 45) should be "flushed" with other transformers.

Response: The three transformers which have not been sampled for PCBs will be treated as PCB-contaminated units unless future sampling is performed to otherwise classify them as non-PCB transformers or PCB transformers. Irrespective of the classification, these units will be drained and flushed on site, unless the disposal facility intends to incinerate them as intact units, as indicated in the subcontract specifications.

Comment: External pad, poles, and adjacent areas should be tested to determine if PCB contamination exists.

Response: Additional sampling for PCB contamination, in areas from which the PCB-containing transformers and other electrical components are to be removed, is planned as part of future chemical characterization activities at the site.

3. Debris Consolidation

Comment: The storage of solid waste on site may be subject to the requirements of the Missouri Solid Waste Management Law. Please contact the Missouri Waste Management Program for assistance in determining whether these requirements apply.

Response: An interim response action proposal is being prepared which will present plans for materials staging and interim storage of solid waste on site. We will contact the Missouri Waste Management Program Office for assistance in determining applicability of the Missouri Solid Waste Management Law to this work.

IRA-700-705

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE ARFS FILE # IR-0800

TABLE OF CONTENTS

The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-800-801

IRA-800-802

IRA-800-803

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

October 16, 1987

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed are six (6) copies of the documentation for the following four (4) Interim Response Actions:

1. Dismantling of Building 401
2. Dismantling of Building 409
3. Removal of PCB Transformers
4. Debris Consolidation

In addition, we are sending under separate cover, six (6) copies of the technical specifications and drawings from each of the four (4) proposed bid packages.

It is our intention to have copies of these documents in place in the repositories for public inspection, and to provide public notice of their availability on October 19, 1987. This will initiate the twenty one (21) day comment period.

If you have any questions, please give me a call.

Sincerely,

J H McCracken
for
Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosures:
As stated

cc w/enclosures:
D. Bedan, MDNR

The public comment period on this interim remedial action ends on November 9, 1987. Comments may be sent to any of the following:

1. Ms. Katherine Biggs
   U. S. Environmental Protection Agency
   Region VII
   726 Minnesota Avenue
   Kansas City, Kansas 66101

2. Mr. David Bedan
   Missouri Department of Natural Resources
   Post Office Box 176
   Jefferson City, Missouri 65102

3. Mr. Rodney R. Nelson
   Weldon Spring Site Remedial Action Project
   Route 2, Highway 94 South
   St. Charles, Missouri 63303

DISMANTLING OF BUILDING 409

Site Background

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metal were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. The buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the Ordnance Works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE.

Building 409 was used as an administrative office building during the operational period of the chemical plant. It is located in the eastern portion of the Weldon Spring complex (Fig. 1) about 90 m (300 ft) southwest of the plant, from which it is separated by a former laboratory building. Since the termination of site activities, Building 409 has remained unoccupied.

Site Characterization

The administration building is a two-story structure designed to house 250 persons. It measures 59 m × 29 m × 10 m (192 ft × 96 ft × 32 ft) and encloses about 3,500 m^2 (38,000 ft^2) of floor space. Office furniture and support equipment have been removed from the building but piping remains intact. Both floors are partitioned into numerous small work areas, including individual offices, telephone/teletype rooms, an equipment room, a vault, and a lobby.

The framework of Building 409 consists of structural steel and concrete. Interior walls are paneled with sheet metal, and exterior walls are composed of masonry blocks. The floor is tiled, and the roof is constructed of metal decking, insulation, and a built-up layer of tar and gravel.

The building was serviced by steam, water, and ethylene glycol lines, and these lines are insulated with asbestos-containing material. The bulk of the insulating material

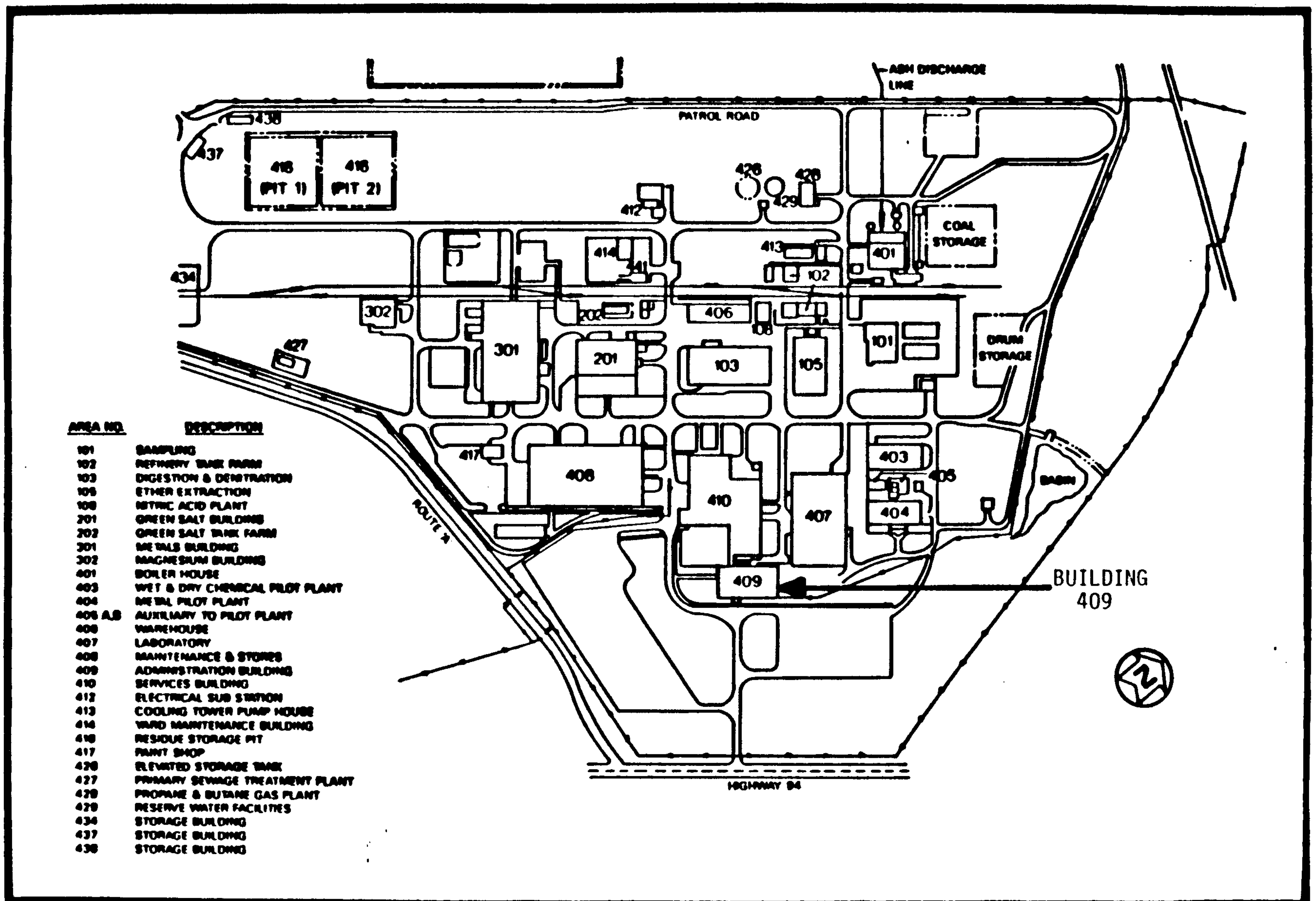


FIGURE 1 Location of Major Structures at the Weldon Spring Site (Source: Bechtel National 1986)

is located in ceiling space between the first and second floors. Although most of the insulation is currently in good condition, i.e., intact and contained by exterior wrappings, there are several localized areas in which friable asbestos has loosened.

A preliminary survey for polychlorinated biphenyls (PCBs) indicated the presence of detectable concentrations of PCBs in the enclosed corridor immediately west of Building 409. Swipe sampling of a 0.6 m × 0.6 m (2 ft × 2 ft) section of the concrete floor surface at this location indicated a PCB level of approximately 100 μg/100 cm^2. Further sampling will be performed to determine the presence and extent of PCB contamination in Building 409.

Results of a radiological survey of the building, presented in Table 1, indicate that contamination levels of the building's floors, walls, and equipment are below the release limits for unrestricted use. These limits are 1,000 disintegrations per minute (dpm)/100 cm^2 removable alpha contamination and 5,000 dpm/100 cm^2 total (fixed plus removable) alpha contamination (U.S. Department of Energy 1987). Since many of the surface areas were wet and muddy when surveyed (resulting in attenuation of alpha particles), beta-gamma measurements were used to estimate the level of alpha activity. Use of beta-gamma measurements will tend to overestimate the actual amount of alpha activity for uranium contamination. This will result in a conservative estimate of the amount of material contaminated in excess of DOE limits for unrestricted release.

Results of an initial survey indicated that three rooms in the building exhibit total beta-gamma contamination levels in excess of the DOE limit for removable alpha contamination (i.e., 1,000 dpm/100 cm^2) but below the limit for total alpha contamination (i.e., 5,000 dpm/100 cm^2). Subsequent sampling of the rooms indicated that the contamination is not removable. Thus, from a radiological standpoint, all of the material inside the building can be released for unrestricted use.

Results of the roof survey given in Table 1 indicate the presence of radioactive contaminants in the tar and gravel layer. The contamination resulted from airborne releases of radioactive dust (containing primarily uranium and its decay products) during the operational period of the chemical plant. Analysis of two samples from the tar/gravel layer identified uranium-238 concentrations of 35.3 and 107.7 pCi/g. (Two samples of the underlying insulation layer had only background levels of uranium.) These measurements indicate that the contamination levels in the built-up tar/gravel roofing material will require that this material be disposed of as radioactive waste.

Threat to Public Health and the Environment

Since its abandonment, the administration building has undergone substantial deterioration. Floor tiles have loosened and begun to break apart, and the roof has weakened to the extent that it leaks badly during rainstorms. Postponed dismantling of the building will result in increased occupational hazards to workers on-site. As an example of the hazards associated with this building, it was necessary to safety-rope a recent survey team during their roof characterization efforts because of unstable structural conditions.

TABLE 1 Summary of Radiological Survey Results for Building 409

Location	Measured Total (Fixed plus Removable) Beta-Gamma Activity	
	Range (dpm/100 cm^2)	Average (dpm/100 cm^2)
First-story floor	0-1,037	257
First-story walls	0-921	253
Second-story floor	0-1,037	212
Second story walls	0-921	297
Roof	2,112-25,147	9,403

Source: Data from MK-Ferguson and Jacobs (1987).

The potential for an asbestos-related health hazard will also increase if the deterioration of Building 409 remains unchecked because the protective coverings that isolate the asbestos from the environment will deteriorate further. In addition, possible PCB contamination of flooring within the building and the radiological contamination of the roof's tar/gravel layer may pose potential exposure hazards to on-site personnel.

Response Objectives

The objectives of this response action are as follows:

1. Reduction of the potential health hazard due to asbestos exposure from asbestos-containing material in Building 409;

2. Reduction of the potential health hazard due to radiation exposure associated with uranium contamination of the roof's tar/gravel layer;

3. Reduction of the potential health hazard due to exposure to floor surfaces that may be contaminated with PCBs; and

4. Removal of the potential safety hazard to on-site personnel due to deterioration of the building.

Proposed Response Action Alternatives

Interim response actions are designed to ensure the health and safety of on-site personnel and to minimize or preclude off-site releases of contamination. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

Alternative response actions identified for Building 409 are:

1. No action;

2. Removal of the tar/gravel roof layer and all PCB-contaminated materials for on-site storage, in-situ stabilization of asbestos-containing material, and repair of the building's structural deficiencies;

3. Removal of the tar/gravel roof layer for on-site storage, removal of all PCB-contaminated material for off-site treatment/disposal, removal of asbestos-containing material for off-site disposal, and repair of the building's structural deficiencies;

4. Dismantlement of Building 409, with on-site disposal of all material except that which exceeds the radiological criteria for unrestricted release (i.e., the tar/gravel roof layer, which will be stored on-site), and transport of all PCB-contaminated material to an off-site treatment/disposal facility; or

5. Dismantlement of Building 409, with off-site disposal of all material except that which exceeds the radiological criteria for unrestricted release (i.e., the tar/gravel roof layer, which will be stored on-site), transport of all PCB-contaminated material to an off-site treatment/disposal facility; transport of the remainder of the waste to a sanitary landfill for disposal; and reclamation of reusable materials that are not radiologically or chemically contaminated for salvage or on-site use.

Analysis of Alternatives

Alternative 1 affords no reduction in the potential health threat posed by the radioactive material and the PCB- and asbestos-contaminated material associated with Building 409. There would be no improvement in environmental conditions at the site if no action were taken. This alternative presents no technical barriers and costs nothing in the short term. However, the building is scheduled for eventual demolition. The costs associated with deferred dismantlement would be higher than those for dismantlement at the current time, due to periodic maintenance activities required until future dismantlement. Most importantly, Alternative 1 is effectively precluded by institutional factors related to the community's strong desire for timely response actions at the Weldon Spring site.

Alternatives 2 through 5 are all technically feasible. Each of these alternatives reduces the potential hazards associated with exposure to PCBs, asbestos, and radiation. Implementation of Alternatives 2 and 3 would be more expensive in the long term, due to the need to repair structural deficiencies and perform future maintenance activities at Building 409. In addition, Alternatives 2 and 3 do not fully address the public sentiment for expedited response at the site. Even though Alternative 4 would be less expensive than Alternative 5, it is not consistent with DOE's intention to dispose of all nonradioactive waste off-site. Therefore, following the screening and analysis process for interim response action alternatives, Alternative 5 has been identified as the preferred alternative.

Description of Proposed Action

The proposed interim response action involves demolition of Building 409 with off-site disposal of all material meeting the criteria for unrestricted radiological release, including PCB-contaminated and asbestos-containing material. The response action will include the following operations.

1. Removal of all PCB-contaminated material for transport to a licensed off-site treatment/disposal facility;

2. Removal of the tar/gravel roofing material to a depth of approximately 5 cm (2 in.) for controlled on-site storage in a dry, concrete-floored building currently located at the Weldon Spring site; and

3. Removal of all asbestos-containing material and dismantlement of the remainder of Building 409, followed by scrap recovery and off-site disposal of the resultant waste material at a licensed sanitary landfill in Missouri.

The foundation and below-grade piping are not part of this action and will be addressed at a later date.

Under the proposed action, Building 409 will be dismantled in full compliance with all applicable regulations and procedures, with off-site disposal of all nonradioacative material (material that exceeds the radiological criteria for unrestricted release will be stored on-site). A representative fraction of material to be disposed of off-site will be radiologically surveyed prior to release. Asbestos removal, removal of the radioactively contaminated roof layer, and PCB decontamination/removal operations will also be performed in accordance with all applicable requirements. This compliance will ensure protection of the safety and health of on-site workers as well as limiting off-site releases of contaminants.

Demolition of Building 401 will proceed in accordance with all safety requirements and practices. Demolition at this time will preclude the associated adverse impacts on health and the environment resulting from continued deterioration of the building. Removal of the demolition debris will be consistent with DOE's goal of removing all nonradioactive waste from the site.

The total waste volume associated with this proposed action is estimated to be approximately 2,000 m^3 (2,700 yd^3), of which about 100 m^3 (130 yd^3) is asbestos-contaminated insulation material and 90 m^3 (120 yd^3) is radioactively contaminated roofing material (the approximate volume of PCB-contaminated material has not yet been determined). The nonradioactive waste will be shipped to a licensed sanitary landfill in Missouri, requiring an estimated 190 truckloads.

References

Bechtel National, Inc., 1986, *Characterization Plan for the Weldon Spring Chemical Plant*, DOE/OR/20722-85, prepared by Advanced Technology Division for U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tenn. (Draft, Feb.).

MK-Ferguson Company and Jacobs Engineering Group, 1987, *Radiological Survey of Building 409, Draft*, prepared for U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tenn. (Sept.).

U.S. Department of Energy, 1987, *U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites* (Revision 2, March).

IRA-800-804

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

NOV 18 1987

OFFICE OF
THE REGIONAL ADMINISTRATOR

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the interim response action for construction of the Ash Pond Dike. We will provide any comments on this proposed action within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay

Morris Kay
Regional Administrator

cc: Dr. Fred Brunner, MDNR

001872
11-23-87
[illegible] 11-20-87

4711

DEC 09 1987

CONCURRENCES

RTG SYMBOL

PEER

INITIALS/SIG.

J. Coyne

DATE

12/7/87

RTG SYMBOL

CE-541

INITIALS/SIG.

R. Nelson

DATE

12/9/87

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of November 9, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR

PEER:JCoyne:x41:mw:12/04/87: (c:EPA-IRA'.Ltr.)

OFFICIAL FILE COPY

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated November 9, 1987 re:

Interim Response Actions

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

General

Comment: Generally, a more thorough analysis and screening of response alternatives would be appropriate.

Response: This comment was reviewed with the EPA (telecon from Rod Nelson to Dan Wall dated 11-17-87). The EPA agreed that while additional analysis and screening is not required for the four (4) IRA proposals addressed herein, future proposals such as the Ash Pond Isolation Dike will present a more thorough analysis of response alternatives.

Comment: The documents do not contain sufficient detail of the work to be done to stand alone without the support of the technical specifications and drawings.

Response: Technical specifications and drawings will continue to accompany the IRA proposal packages submitted for review.

Building Demolition

Comment: Specifics of handling, storage, and ultimate disposal of radioactively contaminated waste should be presented.

Response: Radioactively contaminated waste from demolition of Buildings #401 and #409 will be segregated and stored on-site in a dry, concrete floored building, Building #434 and/or Building #406. Ultimate disposal will be in accordance with the RI Plan/EIS. Specifics of handling this waste will be covered in the Contractor's operational work plan which will integrate the specification and drawings, the WSSRAP Construction Safety and Health Management Program, applicable WSSRAP Standard Operating Procedures and Plans along with the subcontractor dismantling plan. This work plan will be finalized prior to the Subcontractor(s) starting demolition work.

response,txtsheil

Comment: What guidelines will be used by the demolition subcontractor to determine the hazard potential of unknown materials encountered in the work?

Response: Subcontractor personnel who will work on the site will be required to undergo a minimum of 40 hours of initial instruction in hazardous waste operations prior to starting work on site in accordance with 29CFR1910.120. In addition Subcontractor personnel will receive indoctrination training in the known hazards in the work area prior to start of work in accordance with the WSSRAP Construction Safety and Health Management Program and Special Conditions requirement of the subcontract. Unknown (unidentified or unmarked) chemical substances encountered in the work shall be considered potential hazards and shall be reported to the Contractor in accordance with the requirements of the specifications.

The Contractor will also provide health physics, construction safety and industrial hygiene surveillance on a routine basis during all stages of the work. This will include inspections of all work areas to identify potential hazards. Where required, the Contractor will collect bulk samples to identify any unknown or suspected substances. The Contractor will also perform air monitoring, as necessary and prudent, to assess exposure levels of hazardous substances in the workplace.

Comment: The responsibility for determining whether a pollution condition has or will be created should be clearly specified.

Response: The WSSRAP Construction Safety and Health Management Program which is an integral part of site subcontracts assigns responsibility for the identification of potential pollution (environmental) conditions to the Project Management Contractor. The Subcontractor is contractually required to comply with the requirements of the Clean Air Act and the Clean Water Act.

Comment: The specification does not state the health and safety requirements for the subcontractor.

Response: Subcontractor health and safety requirements are defined in the Special Conditions to the subcontract. The Special Conditions bind the Subcontractor to compliance with the WSSRAP Construction Safety and Health Management Program and all applicable Federal, State, and local health and safety regulations and standards listed therein. The Special Conditions are a supplement to the General Conditions and General Provisions which also contain basic health and safety requirements.

PCB Transformer Removal

Comment: In this case, more detail in the site characterization section of the text would be appropriate. For instance, the PCB transformers are categorized as those containing PCBs at concentrations greater than 500 ppm. It may be somewhat misleading not to indicate in the text that the concentrations in these transformers are in excess of 350,000 ppm.

Response: The final subcontract work package includes a table on the subcontract drawings listing each electrical component in the scope of work. This table includes the PCB concentration and volume capacity, in gallons, of each electrical component.

Comment: Disposal facilities under consideration for receipt of these wastes must provide certification that they meet the Superfund offsite policy.

Response: The Work Plan specified in Section 1.2A of Specification Section 02090 includes provision for meeting all requirements of 40CFR761. The Subcontractor's Work Plan in section 1.4A will be required to contain certification that the facilities selected for disposal of the waste material (1) have received written approval from the U. S. Environmental Protection Agency as required under 40CFR Part 761.70 or 761.75, as applicable, and (2) are not under a state or federal compliance order under CERCLA or RCRA.

Debris Consolidation

Comment: It is stated in the description of the response action that one of the response objectives is to "Perform a detailed chemical and radiological characterization of the debris...". The description of the response action and specifications document contain no guidelines, references or information which would allow the Subcontractor to complete this objective.

Response: This objective is to be completed by the Contractor and does not require any special activity by the Subcontractor. Radiological guidelines to be used by the Contractor in performing this characterization are as defined in Draft DOE Order 5480.11 and applicable WSS operating procedures. All debris will be visually inspected for potential chemical contamination. Where chemical contamination is observed or suspected, sampling and analyses will be performed to identify the characteristics of the chemical.

Comment: More specifics regarding the handling, storage and ultimate disposal of radioactive contaminated wastes are needed.

Response: Specifics of handling the radiologically contaminated debris will be finalized upon submittal of the Subcontractor's work plan. That plan will be integrated with applicable WSSRAP Standard Operating Procedures and Plans, the WSSRAP Construction Safety and Health Management Program, and the specifications and drawings. The debris will be consolidated for temporary storage in a materials staging area. Details of the materials staging area will be presented in a separate IRA under preparation. Ultimate disposal of radioactive contaminated debris waste will be in accordance with the RI Plan/EIS.

3589-87-I-DOE-241

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

December 21, 1987

M-K FERGUSON CO.
RECEIVED
DEC 29 1987
WSSRAP CONTRACT 3589

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

MDNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our responsiveness summary for the comments contained in Dave Bedan's letter of November 12, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

J H McCracken
for
Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR, w/enclosure
Jack Hammond, MK-F, w/o enclosure

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated 11-13-87 re: MoDNR comments on:

Interim Response Actions

1. Dismantling and Disposal of Building #401
2. Dismantling and Disposal of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

1. <u>Dismantling and Disposal of Buildings #401 and #409</u>

Comment: The DOE and its Contractors should develop and maintain close contact with the Missouri Air Pollution Control Program to assure compliance with Missouri Air Conservation Law and Missouri Solid Waste Management Law in carrying out these activities.

Response: The DOE and its subcontractor(s) will continue to keep the DNR Air Pollution Control Program office apprised of plans for work at the site involving removal, handling, storage, and/or disposal of asbestos materials.

Comment: Missouri Solid Waste Management Law requires demolition waste to be disposed of in a permitted sanitary or demolition landfill. Asbestos waste must be disposed of in a permitted sanitary landfill.

Response: The Specifications for this work will require that asbestos and other demolition debris be disposed of in accordance with the requirements of the Missouri Solid Waste Management Law.

Comment: DNR maintains that because of the special concerns relating to the volume of waste and to the possible contamination of the asbestos and the other demolition material with hazardous wastes or radioactive wastes, these materials should be handled as "special wastes".

Response: The DOE concurs that there are special circumstances that require handling of asbestos as "special waste". Specifications for the asbestos subcontracts contain this provision.

The pending subcontracts contain the "special waste" forms which will be included in the

subcontract work packages as matter of comity. Should subcontract efforts, cost or progress on these IRA's be impacted by this provision, the DOE will revisit this issue with the MDNR.

Comment: The DNR cannot approve the disposal of the asbestos and other demolition wastes until a procedure is in place to assure us that no radioactive or hazardous materials are being disposed of in Missouri solid waste landfills.

Response: Release standards are in place for controlling release of the rubble off site. Radiological survey and release plans will be developed for each work package involving removal and off-site disposal of materials to insure compliance with the standards.

Comment: DOE should provide justification for its policy to dispose of all non-radioactive building waste off site.

Response: The DOE policy is based on volume reduction and cost effectiveness. By disposal of nonradiological material in a sanitary or demolition landfill, there is a reduction in the amount of material (Volume Reduction) that will be encapsulated in any disposal cell. Secondly, costs for on-site disposal cells are high in comparison to disposal in sanitary or demolition landfills. Also, as an aside to the technical and cost effectiveness issues, the DOE currently has funding available. The site is still to be fully characterized and to delay demolition and disposal of clean materials would not allow these funds to be utilized and also would lead to overall slipping of the schedule.

2. <u>Removal of PCB Transformers</u>

Comment: MDNR recommends that if Alternative #5 is used, during the "flushing" process care should be taken to contain any spilled material. Also, "flushing" should be continued until PCB levels are less than 2 ppm, if transformer and switch carcasses are going to be disposed into a permitted sanitary landfill.

Response: The subcontract specifications for this interim response action include spill control provisions for draining and flushing operations. Spill control pans are specified to collect any spilled liquids. PCB transformers and other electrical

equipment which have been drained and flushed, as stated in the specifications, will be disposed of at an EPA approved PCB disposal facility, not a sanitary landfill.

Comment: If the PCB liquids are being transported to a disposal facility within Missouri, a licensed hazardous waste transporter must be used. If the PCBs are being transported to an out-of-state facility MDNR recommends that a licensed transporter be used although it is not a requirement.

Response: The specifications state that the transporter of the PCB liquids and drained electrical equipment shall be licensed.

Comment: In the preamble to 40 CFR 761, unless otherwise tested, all dielectric transformers are assumed to contain 50-500 ppm PCB, therefore untested transformers (22, 32, and 45) should be "flushed" with other transformers.

Response: The three transformers which have not been sampled for PCBs will be treated as PCB-contaminated units unless future sampling is performed to otherwise classify them as non-PCB transformers or PCB transformers. Irrespective of the classification, these units will be drained and flushed on site, unless the disposal facility intends to incinerate them as intact units, as indicated in the subcontract specifications.

Comment: External pad, poles, and adjacent areas should be tested to determine if PCB contamination exists.

Response: Additional sampling for PCB contamination, in areas from which the PCB-containing transformers and other electrical components are to be removed, is planned as part of future chemical characterization activities at the site.

3. <u>Debris Consolidation</u>

Comment: The storage of solid waste on site may be subject to the requirements of the Missouri Solid Waste Management Law. Please contact the Missouri Waste Management Program for assistance in determining whether these requirements apply.

Response: An interim response action proposal is being prepared which will present plans for materials staging and interim storage of solid waste on site. We will contact the Missouri Waste Management Program Office for assistance in determining applicability of the Missouri Solid Waste Management Law to this work.

IRA-800-805

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

January 10, 1990

Mr. Dan Wall
Remedial Project Manager
U. S. Environmental Protection
Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Mr. Wall:

CONTRACT NO. DE-AC05-860R21548 - MODIFICATIONS TO THE BUILDING 409 DISMANTLING AND BUILDING 401 DISMANTLING EE/CAs

Part of the work performed for IRA 10, Building 409 Dismantling, and IRA 11, Building 401 Dismantling, was conducted in a manner other than that originally planned (as documented in the respective EE/CAs). The original plan for building demolition material was to use a sanitary landfill in Missouri for off site disposal. However, it was later determined that the specified landfill was not in compliance with applicable regulations; therefore, the waste was disposed of in an Illinois sanitary landfill that was in regulatory compliance. It was originally planned to store the tar and gravel roofing material on site in a dry concrete-floored building. Actually, the gravel has been stored in a dry concrete building. The tar and felt material has been stored on pad 303 under a synthetic membrane cover, in a manner that achieves a similar level of protection.

Please accept this letter as a supplement to the Building 409 Dismantling and Building 401 Dismantling EE/CAs.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

cc: Susan Meyers, PMC

INTERIM RESPONSE ACTION (IRA) ADMINISTRATIVE RECORD FILE ARFS FILE # IR-0900

TABLE OF CONTENTS

The administrative record documents will be numbered when the Record of Decision document is finalized and included in the administrative record.

IRA-900-901

IRA-900-902

IRA-900-903

3589-87-I-DOE-177

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

October 16, 1987

M-K FERGUSON CO.
RECEIVED
OCT 20 1987
WSSRAP CONTRACT 3589

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed are six (6) copies of the documentation for the following four (4) Interim Response Actions:

1. Dismantling of Building 401
2. Dismantling of Building 409
3. Removal of PCB Transformers
4. Debris Consolidation

In addition, we are sending under separate cover, six (6) copies of the technical specifications and drawings from each of the four (4) proposed bid packages.

It is our intention to have copies of these documents in place in the repositories for public inspection, and to provide public notice of their availability on October 19, 1987. This will initiate the twenty one (21) day comment period.

If you have any questions, please give me a call.

Sincerely,

J H McCracken for
Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosures:
As stated

cc w/enclosures:
D. Bedan, MDNR

DOCUMENT NUMBER: I-900-901-1.01

The public comment period on this interim remedial action ends on November 9, 1987. Comments may be sent to any of the following:

1. Ms. Katherine Biggs
   U. S. Environmental Protection Agency
   Region VII
   726 Minnesota Avenue
   Kansas City, Kansas 66101

2. Mr. David Bedan
   Missouri Department of Natural Resources
   Post Office Box 176
   Jefferson City, Missouri 65102

3. Mr. Rodney R. Nelson
   Weldon Spring Site Remedial Action Project
   Route 2, Highway 94 South
   St. Charles, Missouri 63303

DISMANTLING OF BUILDING 401

Site Background

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metal were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. The buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the Ordnance Works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE.

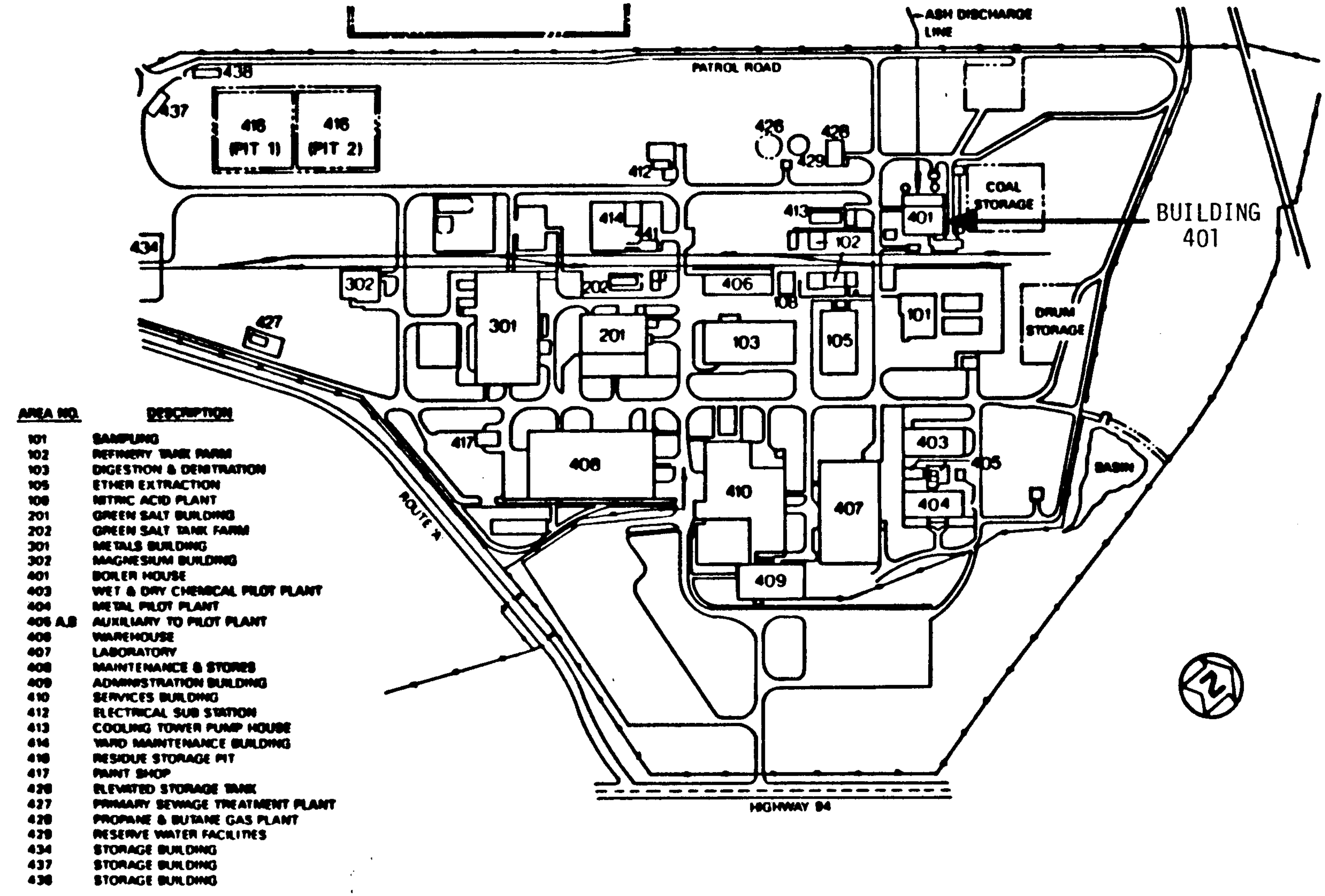
Building 401, the steam plant, is located in the northwest section of the Weldon Spring site (Fig. 1). The coal-fired steam plant previously provided the energy necessary to support uranium- and thorium-processing activities at the site.

Site Characterization

Building 401 is a three-story rectangular structure with approximate dimensions of 33 m × 30 m × 12 m (107 ft × 98 ft × 38 ft) and nearly 1,600 m^2 (17,500 ft^2) of floor space. Equipment and piping within the plant are generally in place and intact.

The first floor of the building contains numerous pieces of process equipment. The second floor contains small offices and an instrument control room and provides access to three external coal-fired boilers. Structural steel frames support the boilers and the induced-draft fans that previously discharged exhaust gases to the atmosphere via two external steel stacks. The building's third floor houses equipment related to its previous use as a service area for the overhead crane and storage tanks.

The roof of Building 401 consists of three tiers constructed of metal decking, insulation, and built-up tar and gravel. The floors are concrete, and the walls are composed of corrugated cement-asbestos siding attached to structural steel and concrete. An associated coal conveyor system also contains asbestos siding, and a major portion of the plant's boilers and steam and process equipment lines are insulated with



AREA NO.	DESCRIPTION
101	SAMPLING
102	REFINERY TANK FARM
103	DIGESTION & DENITRATION
105	ETHER EXTRACTION
108	NITRIC ACID PLANT
201	GREEN SALT BUILDING
202	GREEN SALT TANK FARM
301	METALS BUILDING
302	MAGNESIUM BUILDING
401	BOILER HOUSE
403	WET & DRY CHEMICAL PILOT PLANT
404	METAL PILOT PLANT
405 A,B	AUXILIARY TO PILOT PLANT
406	WAREHOUSE
407	LABORATORY
408	MAINTENANCE & STORES
409	ADMINISTRATION BUILDING
410	SERVICES BUILDING
412	ELECTRICAL SUB STATION
413	COOLING TOWER PUMP HOUSE
414	YARD MAINTENANCE BUILDING
416	RESIDUE STORAGE PIT
417	PAINT SHOP
426	ELEVATED STORAGE TANK
427	PRIMARY SEWAGE TREATMENT PLANT
428	PROPANE & BUTANE GAS PLANT
429	RESERVE WATER FACILITIES
434	STORAGE BUILDING
437	STORAGE BUILDING
438	STORAGE BUILDING

FIGURE 1 Location of Major Structures at the Weldon Spring Site (Source: Bechtel National 1986)

asbestos-containing materials. Although the siding is currently intact and most of the insulating material is in good condition, portions of the insulation have deteriorated and fallen to the floor in some areas.

Steam was produced in Building 401 by the combustion of coal. Coal combustion involves no radioactive material other than the very low concentrations of radioactive materials that occur naturally in coal. Therefore, the potential for radiological contamination of the building's interior would have resulted only from the movement of personnel and equipment into and out of the building, and the radiological survey of the plant was conducted with emphasis on traffic areas and portable equipment.

Results of the radiological survey, summarized in Table 1, indicate that contamination levels of the building's floors, walls, and equipment are below DOE's release limits for unrestricted use. These limits are 1,000 disintegrations per minute (dpm)/100 cm^2 removable alpha contamination and 5,000 dpm/100 cm^2 total alpha contamination (U.S. Department of Energy 1987). In fact, the highest reported value for total (fixed plus removable) contamination is below the lower removable contamination limit.

Results of a beta-gamma radiological survey of the roof, summarized in Table 2, indicate the presence of radioactive contaminants in the tar and gravel layer. The contamination resulted from airborne releases of radioactive dust (primarily containing uranium and its decay products) that occurred during the chemical plant processing period. Because the contamination has likely migrated into the tar (resulting in attenuation of alpha particles), beta-gamma activity was measured to provide an indication of the alpha activity associated with the roof layer. Survey results indicate that the contamination levels in the built-up tar/gravel roofing material will require that these materials be disposed of as radioactive waste. To confirm the need to treat the roofing material as radioactive waste, two samples of the tar/gravel layer were collected and analyzed by gamma spectrometry. The results, presented in Table 3, show that the primary contaminant is uranium.

Threat to Public Health and the Environment

Although most of Building 401 remains intact, some deterioration has occurred during the past two decades of disuse. At certain locations, asbestos-containing material has begun to deteriorate and fall to the floor. Interior air monitoring results indicate that concentrations of asbestos fibers do not currently pose a significant inhalation hazard. However, if deterioration of the building continues, the potential threat to public health posed by asbestos exposure will increase. In addition, the radiological contamination of the roof's tar/gravel layer poses an exposure hazard to workers in the area.

TABLE 1 Summary of Alpha Contamination in Building 401[a]

		Measured Total (Fixed plus Removable) Alpha Activity	
Level	Surface	Range (dpm/100 cm^2)	Average (dpm/100 cm^2)
1	Floor	0-224	81
	Walls	0-143	75
	Equipment	0-265	118
2	Floor	20-673	200
	Walls	41-673	206
	Equipment	20-224	124
3	Floor	61-388	226
	Walls	41-224	135
	Equipment	20-143	82

[a]Does not include the roof.

Source: Data from MK-Ferguson and Jacobs (1987b).

TABLE 2 Summary of Radioactivity Measurements on the Roof (Tar/Gravel) of Building 401

	Beta-Gamma Measurements	
Tier	Range (dpm/100 cm^2)	Average (dpm/100 cm^2)
1	1,997-5,414	3,627
2	3,341-5,261	4,077
3	3,533-3,955	3,763

Source: Data from MK-Ferguson and Jacobs (1987b).

TABLE 3 Gamma Spectrometry Measurements of the Tar/Gravel Roof Layer of Building 401

Sample	Radionuclide Concentration (pCi/g) Uranium-238	Radium-226	Radium-228
1	106.3	3.1	1.6
2	58.1	2.4	1.3

Source: Data from MK-Ferguson and Jacobs (1987a).

Response Objectives

The objectives of this response action are as follows:

1. Reduction of the potential health hazard due to asbestos exposure from asbestos-containing materials in Building 401;

2. Reduction of the potential health hazard due to radiation exposure associated with uranium contamination of the roof's tar/gravel layer; and

3. Removal of the potential safety hazard to on-site personnel associated with the deteriorating building.

Proposed Response Action Alternatives

Interim response actions are designed to ensure the health and safety of on-site personnel and to minimize or preclude off-site releases of contamination. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., actions will be limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

Alternative response actions identified for Building 401 are:

1. No action;

2. Removal of the tar/gravel roof layer for on-site storage, in-situ stabilization of asbestos-containing material, and repair of the building's structural deficiencies;

3. Removal of the tar/gravel roof layer for on-site storage, removal of asbestos-containing material for off-site disposal, and repair of the building's structural deficiencies;

4. Dismantlement of Building 401, with on-site storage of all material that exceeds the radiological criteria for unrestricted release (i.e., the tar/gravel roof layer) and on-site disposal of all other material; or

5. Dismantlement of Building 401, with off-site disposal of all material except that which exceeds the radiological criteria for unrestricted release (i.e., the tar/gravel roof layer, which will be stored on-site), and reclamation of reusable materials that are not radiologically or chemically contaminated for salvage or on-site use.

Analysis of Alternatives

Alternative 1 affords no reduction in the potential health threat posed by radioactive and asbestos-containing material associated with Building 401. There would be no improvement in environmental conditions at the site if no action were taken. This alternative presents no technical barriers and costs nothing in the short term. However, the building is scheduled for eventual demolition. The costs associated with deferred dismantlement would be higher than those for dismantlement at the current time, due to periodic maintenance activities required until future dismantlement. Most importantly, Alternative 1 is effectively precluded by institutional factors related to the community's strong desire for timely response actions at the Weldon Spring site.

Alternatives 2 through 5 are all technically feasible. Each of these alternatives reduces the potential hazard associated with asbestos and radiation exposure. Implementation of Alternatives 2 and 3 would be more expensive in the long term, due to the need to repair structural deficiencies and perform future maintenance activities at Building 401. In addition, Alternatives 2 and 3 do not fully address the public sentiment for expedited response at the site. Even though Alternative 4 would be less expensive than Alternative 5, it is not consistent with DOE's intention to dispose of all non-radioactive waste off-site. Therefore, following the screening and analysis process for interim response action alternatives, Alternative 5 has been identified as the preferred alternative.

Description of Proposed Action

The proposed interim response action involves demolition of Building 401 with off-site disposal of all material meeting the criteria for unrestricted release -- including asbestos-containing material. The response action will include the following operations.

1. Removal of the tar/gravel roofing material to a depth of approximately 5 cm (2 in.) for controlled on-site storage in a dry,

concrete-floored building currently located at the Weldon Spring site; and

2. Removal of all asbestos-containing material, equipment, and piping, and dismantlement of the remainder of Building 401 and ancillary structures, i.e., the external stacks and boilers, followed by scrap recovery and off-site disposal of the resultant waste material at a licensed sanitary landfill in Missouri.

The foundation and below-grade piping are not part of this action and will be addressed at a later date.

Under the proposed action, Building 401 will be dismantled in full compliance with all applicable regulations and procedures, with off-site disposal of all nonradioactive material (material that exceeds the radiological criteria for unrestricted release will be stored on-site). A representative fraction of material to be disposed of off-site will be radiologically surveyed prior to release. Asbestos removal and removal of the radioactively contaminated roof layer will be also performed in accordance with all applicable requirements. This compliance will ensure protection of the safety and health of on-site workers as well as limit off-site releases of contaminants.

Demolition of Building 401 will proceed in accordance with all safety requirements and practices. Demolition at this time will preclude the associated adverse impacts on health and the environment resulting from continued deterioration of the building. Removal of the demolition debris will be consistent with DOE's goal of removing all nonradioactive waste from the site.

The total waste volume is estimated to be 2,800 m^3 (3,600 yd^3), of which about 400 m^3 (500 yd^3) is asbestos-containing material and 40 m^3 (50 yd^3) is radioactive waste. The nonradioactive waste will be shipped to a licensed sanitary landfill in Missouri, requiring an estimated 250 truckloads.

References

Bechtel National, Inc., 1986, *Characterization Plan for the Weldon Spring Chemical Plant*, DOE/OR/20722-95, prepared by Advanced Technology Division for U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tenn. (Draft, Feb.).

MK-Ferguson Company and Jacobs Engineering Group, 1987a, *Weldon Spring Site Remedial Action Project, Hp Ge Radio-Isotope Analysis*, ES-19-01-12, prepared by Environmental, Safety, and Health Department, Weldon Spring, Mo. (July).

MK-Ferguson Company and Jacobs Engineering Group, 1987b, *Radiological Survey Report for the Weldon Spring Chemical Plant Steam Production Facility*, prepared for U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tenn. (Sept.).

U.S. Department of Energy, 1987, *U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites* (Revision 2, March).

IRA-900-904

4/240.2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

NOV 18 1987

OFFICE OF
THE REGIONAL ADMINISTRATOR

Mr. Rodney R. Nelson
U.S. Department of Energy
Weldon Spring Site Remedial
Action Project/Office
Route 2, Highway 94, South
St. Charles, Missouri 63303

Dear Mr. Nelson:

We have reviewed the Department of Energy's (DOE) proposals for the following four interim response actions:

- Dismantling of Building 401,
- Dismantling of Building 409,
- Removal of PCB Transformers, and
- Debris Consolidation.

Our comments on these proposals were sent to you earlier. You were also provided comments by the Missouri Department of Natural Resources (MDNR). No comments from the public were directed to the Environmental Protection Agency (EPA) and according to our records, there has been no public comment directed to MDNR or DOE.

We are in agreement these actions should proceed to ensure worker safety and reduce the further release of contaminants from this site. The EPA hereby approves these actions under the condition that the comments earlier provided by EPA and MDNR are adequately addressed. The MDNR has notified me they also concur with these actions. Please provide copies of any summary reports for these actions to EPA and MDNR.

We also received copies of the interim response action for construction of the Ash Pond Dike. We will provide any comments on this proposed action within the agreed upon 21-day comment period. We are most pleased to see that activities are underway to stabilize the site and reduce contaminant release.

Sincerely yours,

Morris Kay

Morris Kay
Regional Administrator

cc: Dr. Fred Brunner, MDNR

DOCUMENT NUMBER: I-900-904-1.01

001872
11-23-87

4711

DEC 09 1987

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

USEPA COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our response to the comments contained in your letter of November 9, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

ORIGINAL SIGNED BY:
R. R. NELSON

Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR

CONCURRENCES
RTG SYMBOL: PEER
INITIALS/SIG: J. Coyne
DATE: 12/7/87
RTG SYMBOL: CE-541
INITIALS/SIG: R. Nelson
DATE: 12/9/87
RTG SYMBOL
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PEER:JCoyne:x41:mw:12/04/87: (c:EPA-IRA'.Ltr.) DOCUMENT NUMBER: I-900-904-1.02

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated November 9, 1987 re:

Interim Response Actions

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

General

Comment: Generally, a more thorough analysis and screening of response alternatives would be appropriate.

Response: This comment was reviewed with the EPA (telecon from Rod Nelson to Dan Wall dated 11-17-87). The EPA agreed that while additional analysis and screening is not required for the four (4) IRA proposals addressed herein, future proposals such as the Ash Pond Isolation Dike will present a more thorough analysis of response alternatives.

Comment: The documents do not contain sufficient detail of the work to be done to stand alone without the support of the technical specifications and drawings.

Response: Technical specifications and drawings will continue to accompany the IRA proposal packages submitted for review.

Building Demolition

Comment: Specifics of handling, storage, and ultimate disposal of radioactively contaminated waste should be presented.

Response: Radioactively contaminated waste from demolition of Buildings #401 and #409 will be segregated and stored on-site in a dry, concrete floored building, Building #434 and/or Building #406. Ultimate disposal will be in accordance with the RI Plan/EIS. Specifics of handling this waste will be covered in the Contractor's operational work plan which will integrate the specification and drawings, the WSSRAP Construction Safety and Health Management Program, applicable WSSRAP Standard Operating Procedures and Plans along with the subcontractor dismantling plan. This work plan will be finalized prior to the Subcontractor(s) starting demolition work.

response,txtsheil

DOCUMENT NUMBER: I-900-904-1.02

Comment: What guidelines will be used by the demolition subcontractor to determine the hazard potential of unknown materials encountered in the work?

Response: Subcontractor personnel who will work on the site will be required to undergo a minimum of 40 hours of initial instruction in hazardous waste operations prior to starting work on site in accordance with 29CFR1910.120. In addition Subcontractor personnel will receive indoctrination training in the known hazards in the work area prior to start of work in accordance with the WSSRAP Construction Safety and Health Management Program and Special Conditions requirement of the subcontract. Unknown (unidentified or unmarked) chemical substances encountered in the work shall be considered potential hazards and shall be reported to the Contractor in accordance with the requirements of the specifications.

The Contractor will also provide health physics, construction safety and industrial hygiene surveillance on a routine basis during all stages of the work. This will include inspections of all work areas to identify potential hazards. Where required, the Contractor will collect bulk samples to identify any unknown or suspected substances. The Contractor will also perform air monitoring, as necessary and prudent, to assess exposure levels of hazardous substances in the workplace.

Comment: The responsibility for determining whether a pollution condition has or will be created should be clearly specified.

Response: The WSSRAP Construction Safety and Health Management Program which is an integral part of site subcontracts assigns responsibility for the identification of potential pollution (environmental) conditions to the Project Management Contractor. The Subcontractor is contractually required to comply with the requirements of the Clean Air Act and the Clean Water Act.

Comment: The specification does not state the health and safety requirements for the subcontractor.

Response: Subcontractor health and safety requirements are defined in the Special Conditions to the subcontract. The Special Conditions bind the Subcontractor to compliance with the WSSRAP Construction Safety and Health Management Program and all applicable Federal, State, and local health and safety regulations and standards listed therein. The Special Conditions are a supplement to the General Conditions and General Provisions which also contain basic health and safety requirements.

PCB Transformer Removal

Comment: In this case, more detail in the site characterization section of the text would be appropriate. For instance, the PCB transformers are categorized as those containing PCBs at concentrations greater than 500 ppm. It may be somewhat misleading not to indicate in the text that the concentrations in these transformers are in excess of 350,000 ppm.

Response: The final subcontract work package includes a table on the subcontract drawings listing each electrical component in the scope of work. This table includes the PCB concentration and volume capacity, in gallons, of each electrical component.

Comment: Disposal facilities under consideration for receipt of these wastes must provide certification that they meet the Superfund offsite policy.

Response: The Work Plan specified in Section 1.2A of Specification Section 02090 includes provision for meeting all requirements of 40CFR761. The Subcontractor's Work Plan in section 1.4A will be required to contain certification that the facilities selected for disposal of the waste material (1) have received written approval from the U. S. Environmental Protection Agency as required under 40CFR Part 761.70 or 761.75, as applicable, and (2) are not under a state or federal compliance order under CERCLA or RCRA.

Debris Consolidation

Comment: It is stated in the description of the response action that one of the response objectives is to "Perform a detailed chemical and radiological characterization of the debris...". The description of the response action and specifications document contain no guidelines, references or information which would allow the Subcontractor to complete this objective.

Response: This objective is to be completed by the Contractor and does not require any special activity by the Subcontractor. Radiological guidelines to be used by the Contractor in performing this characterization are as defined in Draft DOE Order 5480.11 and applicable WSS operating procedures. All debris will be visually inspected for potential chemical contamination. Where chemical contamination is observed or suspected, sampling and analyses will be performed to identify the characteristics of the chemical.

Comment: More specifics regarding the handling, storage and ultimate disposal of radioactive contaminated wastes are needed.

Response: Specifics of handling the radiologically contaminated debris will be finalized upon submittal of the Subcontractor's work plan. That plan will be integrated with applicable WSSRAP Standard Operating Procedures and Plans, the WSSRAP Construction Safety and Health Management Program, and the specifications and drawings. The debris will be consolidated for temporary storage in a materials staging area. Details of the materials staging area will be presented in a separate IRA under preparation. Ultimate disposal of radioactive contaminated debris waste will be in accordance with the RI Plan/EIS.

3589-87-I-DOE-241

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

December 21, 1987

M-K FERGUSON CO.
RECEIVED
DEC 29 1987
WSSRAP CONTRACT 3589

Ms. B. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

MDNR COMMENTS ON INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed is our responsiveness summary for the comments contained in Dave Bedan's letter of November 12, 1987, regarding the following interim response actions:

1. Dismantling of Building #401
2. Dismantling of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

We anticipate that this will adequately resolve the issues raised. We intend to proceed with action on these items in accordance with the enclosure.

If you have any questions, please give me a call.

Sincerely,

J H McCracken
for
Rod Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: Dave Bedan, MDNR, w/enclosure
Jack Hammond, MK-F, w/o enclosure

DOCUMENT NUMBER: I-900-904-1.03

RESPONSIVENESS SUMMARY

B. Katherine Biggs letter to Rodney R. Nelson, dated 11-13-87 re: MoDNR comments on:

Interim Response Actions

1. Dismantling and Disposal of Building #401
2. Dismantling and Disposal of Building #409
3. Removal of PCB Transformers
4. Debris Consolidation

1. <u>Dismantling and Disposal of Buildings #401 and #409</u>

Comment: The DOE and its Contractors should develop and maintain close contact with the Missouri Air Pollution Control Program to assure compliance with Missouri Air Conservation Law and Missouri Solid Waste Management Law in carrying out these activities.

Response: The DOE and its subcontractor(s) will continue to keep the DNR Air Pollution Control Program office apprised of plans for work at the site involving removal, handling, storage, and/or disposal of asbestos materials.

Comment: Missouri Solid Waste Management Law requires demolition waste to be disposed of in a permitted sanitary or demolition landfill. Asbestos waste must be disposed of in a permitted sanitary landfill.

Response: The Specifications for this work will require that asbestos and other demolition debris be disposed of in accordance with the requirements of the Missouri Solid Waste Management Law.

Comment: DNR maintains that because of the special concerns relating to the volume of waste and to the possible contamination of the asbestos and the other demolition material with hazardous wastes or radioactive wastes, these materials should be handled as "special wastes".

Response: The DOE concurs that there are special circumstances that require handling of asbestos as "special waste". Specifications for the asbestos subcontracts contain this provision.

The pending subcontracts contain the "special waste" forms which will be included in the

DOCUMENT NUMBER: I-900-904-1.03

subcontract work packages as matter of comity. Should subcontract efforts, cost or progress on these IRA's be impacted by this provision, the DOE will revisit this issue with the MDNR.

Comment: The DNR cannot approve the disposal of the asbestos and other demolition wastes until a procedure is in place to assure us that no radioactive or hazardous materials are being disposed of in Missouri solid waste landfills.

Response: Release standards are in place for controlling release of the rubble off site. Radiological survey and release plans will be developed for each work package involving removal and off-site disposal of materials to insure compliance with the standards.

Comment: DOE should provide justification for its policy to dispose of all non-radioactive building waste off site.

Response: The DOE policy is based on volume reduction and cost effectiveness. By disposal of nonradiological material in a sanitary or demolition landfill, there is a reduction in the amount of material (Volume Reduction) that will be encapsulated in any disposal cell. Secondly, costs for on-site disposal cells are high in comparison to disposal in sanitary or demolition landfills. Also, as an aside to the technical and cost effectiveness issues, the DOE currently has funding available. The site is still to be fully characterized and to delay demolition and disposal of clean materials would not allow these funds to be utilized and also would lead to overall slipping of the schedule.

2. Removal of PCB Transformers

Comment: MDNR recommends that if Alternative #5 is used, during the "flushing" process care should be taken to contain any spilled material. Also, "flushing" should be continued until PCB levels are less than 2 ppm, if transformer and switch carcasses are going to be disposed into a permitted sanitary landfill.

Response: The subcontract specifications for this interim response action include spill control provisions for draining and flushing operations. Spill control pans are specified to collect any spilled liquids. PCB transformers and other electrical

equipment which have been drained and flushed, as stated in the specifications, will be disposed of at an EPA approved PCB disposal facility, not a sanitary landfill.

Comment: If the PCB liquids are being transported to a disposal facility within Missouri, a licensed hazardous waste transporter must be used. If the PCBs are being transported to an out-of-state facility MDNR recommends that a licensed transporter be used although it is not a requirement.

Response: The specifications state that the transporter of the PCB liquids and drained electrical equipment shall be licensed.

Comment: In the preamble to 40 CFR 761, unless otherwise tested, all dielectric transformers are assumed to contain 50-500 ppm PCB, therefore untested transformers (22, 32, and 45) should be "flushed" with other transformers.

Response: The three transformers which have not been sampled for PCBs will be treated as PCB-contaminated units unless future sampling is performed to otherwise classify them as non-PCB transformers or PCB transformers. Irrespective of the classification, these units will be drained and flushed on site, unless the disposal facility intends to incinerate them as intact units, as indicated in the subcontract specifications.

Comment: External pad, poles, and adjacent areas should be tested to determine if PCB contamination exists.

Response: Additional sampling for PCB contamination, in areas from which the PCB-containing transformers and other electrical components are to be removed, is planned as part of future chemical characterization activities at the site.

3. <u>Debris Consolidation</u>

Comment: The storage of solid waste on site may be subject to the requirements of the Missouri Solid Waste Management Law. Please contact the Missouri Waste Management Program for assistance in determining whether these requirements apply.

Response: An interim response action proposal is being prepared which will present plans for materials staging and interim storage of solid waste on site. We will contact the Missouri Waste Management Program Office for assistance in determining applicability of the Missouri Solid Waste Management Law to this work.

IRA-900-905

Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

January 10, 1990

Mr. Dan Wall
Remedial Project Manager
U. S. Environmental Protection
Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Mr. Wall:

CONTRACT NO. DE-AC05-860R21548 - MODIFICATIONS TO THE BUILDING 409 DISMANTLING AND BUILDING 401 DISMANTLING EE/CAs

Part of the work performed for IRA 10, Building 409 Dismantling, and IRA 11, Building 401 Dismantling, was conducted in a manner other than that originally planned (as documented in the respective EE/CAs). The original plan for building demolition material was to use a sanitary landfill in Missouri for off site disposal. However, it was later determined that the specified landfill was not in compliance with applicable regulations; therefore, the waste was disposed of in an Illinois sanitary landfill that was in regulatory compliance. It was originally planned to store the tar and gravel roofing material on site in a dry concrete-floored building. Actually, the gravel has been stored in a dry concrete building. The tar and felt material has been stored on pad 303 under a synthetic membrane cover, in a manner that achieves a similar level of protection.

Please accept this letter as a supplement to the Building 409 Dismantling and Building 401 Dismantling EE/CAs.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

cc: Susan Meyers, PMC

DOCUMENT NUMBER: I-900-905-1.01